Review of Significant Trade: Species selected by the CITES Animals Committee following CoP14 and retained in the review following AC25

CITES Project No. S-380

Prepared for the CITES Secretariat by

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CITATION

UNEP-WCMC (2012). *Review of Significant Trade: Species selected by the CITES Animals Committee following CoP14 and retained in the review following AC25*.

PREPARED FOR

CITES Secretariat, Geneva, Switzerland.

DISCLAIMER

Contents

Introduction

The provisional categorisation for each species sheet follows the criteria outlined in Resolution 12.8 (Rev. CoP13) as follows:

> i) 'species of urgent concern' shall include species for which the available information indicates that the provisions of Article IV, paragraph 2 (a), 3 or 6 (a), are not being implemented;
> ii) 'species of possible concern' shall include species for which it is not clear whether or not these provisions are being implemented; and
> iii) 'species of least concern' shall include species for which the available information appears to indicate that these provisions are being met;

Trade data were extracted from the CITES Trade Database on 5th September 2011 for inclusion in this report. Export data from range States under review that were subsequently received by 25th November 2011 were also included in the report. For *Huso huso,* trade data held within the Caviar Database was extracted on 10th November 2011.

Several countries reviewed are not currently party to CITES (e.g. Angola, South Sudan, Turkmenistan) and hence are not required to submit CITES annual reports. For this reason, available trade data may not provide a complete picture of international trade and, for some years, only data provided by importers are available.

The CITES Management and Scientific Authorities (or non-Party equivalents) for each range State were contacted by post and, where possible, by email and fax in September/October 2011. Authorities were asked to provide information on conservation status, trade and management of each taxon, including the basis for making non-detriment findings. Where possible, national experts were also contacted to provide additional country-specific information.

Tursiops aduncus Ehrenberg, 1833: Solomon Islands

Delphinidae, Indian Ocean Bottlenose Dolphin, Indo-Pacific Bottlenose Dolphin.

Selection for Review of Significant Trade

Tursiops aduncus was initially proposed for inclusion in the Review of Significant Trade by Israel at the 23rd meeting of the Animals Committee in 2008 (document AC23 Doc. 8.5.1) on the basis of proposed exports and the apparent lack of a non-detriment finding, but this was later withdrawn (AC23 Summary Record). At the same meeting, the Animals Committee encouraged the Solomon Islands to pursue research on the species' population status, participate at an IUCN Cetacean Specialist Group meeting addressing population assessment and develop a case study for a non-detriment finding workshop in Mexico (AC23 Summary Record). *T. aduncus* was selected at AC24 on the basis that even low trade levels might affect the population, and the Animals Committee recommended that the Solomon Islands set a more cautious export quota (AC24 Summary Record).

A. Summary

Overview of *Tursiops aduncus* recommendations.

Range State	Provisional category	Summary
Solomon Islands	Possible Concern	The population size in the country is unclear. The Solomon Islands Fisheries department report population estimates of 9 738-13 775 and 12 000-15 000, however, the survey methodology is contested and there are suggestions that the population may be smaller, in the low 100s of animals. The results of monitoring recommended by AC23 is not yet available, but is due by AC26. Exports of 61 live specimens 2003-2007 were reported in the CITES Trade Database and 108 live specimens according to Solomon Islands CITES Authorities 2003-2011, 25 of which were exported in 2011. An annual quota of 50 animals was endorsed in 2009 by the Solomon Islands. Further clarity on population size, treatment of by-catch and effectiveness of protection measures is required to assess the impact of trade on the population. The Solomon Islands has previously indicated that a non-detriment finding has been undertaken, however, the basis for this has been challenged by some authors. No further information on non-detriment findings has been received through this review process from the Solomon Islands. Given the concerns raised regarding the available data, it is not clear whether or not the provisions of Article IV are being implemented and the species is categorised as Possible Concern. This categorisation may merit revision when the results of more comprehensive survey work undertaken during 2009-2011 are available for discussion by AC26.

B. Species overview

Biology: *Tursiops aduncus* primarily occurs in inshore areas with either reef, sandy or sea grass beds, commonly less than 100 m depth, and no more than 200 m depth (Wang and Yang, 2009). The species does not enter far into turbid waters of estuaries (Wang and Yang, 2009). It is generally a coastal species but there are reports of movement across deep oceanic waters (Wang and Yang, 2009). The species typically lives in relatively small groups (Reeves and Brownell, 2009).

Life history information for *T. aduncus* is limited (Wang and Yang, 2009) and data mainly come from study sites in Australia and Japan (Reeves and Brownell, 2009). Age at sexual maturity typically ranges from 10-15 years, varying between sexes and populations (Wang and Yang, 2009). The inter-birth interval for *T. aduncus* is commonly between 3-6 years, with a maximum lifespan estimated at about 40 years (Wang and Yang, 2009).

The diet of *T. aduncus* varies geographically, but throughout most of the species' distribution consists of benthic and reef-dwelling fish and cephalopods of continental shelf waters (Ross, 1977; Ross, 1984 cited in Wang and Yang, 2009).

Taxonomic note: *T. aduncus* was recognised as a distinct species by CITES at CoP13 in October 2004 (CoP13 Doc. 9.3.1) based on Wang *et al.* (1999); the distinction between *T. aduncus* and *T. truncatus* was made on the basis of differences in external morphology, genetics and osteology between reproductively isolated sympatric forms of the western North Pacific (Wang *et al.,* 1999; 2000a; 2000b).

C. Country review

SOLOMON ISLANDS

Distribution in range State: Globally, *T. aduncus* has a discontinuous distribution in the warm temperate to tropical Indo-Pacific, from South Africa in the west, the Indian Ocean to Southern Japan and northern Australia, as well as oceanic islands distant from land masses within the range (Hammond *et al*., 2008; Brownell and Reeves, 2008).

The Solomon Islands has an Exclusive Economic Zone area of 1.37 million sq km, of which 26 000 sq km is part of a continental shelf area (WRI, 2000). Published information on the species' distribution, population structure, past catches and population numbers in the Solomon Islands appears to be lacking. Distinguishing *T. aduncus* from the common bottlenose dolphin *T. truncatus* has presented a challenge in accurately establishing distribution records for the species, although *T. truncatus* has not been confirmed in near-shore waters of the Solomon Islands (Reeves and Horokou, 2008). Limited survey data (Kahn, 2006; Defran cited in Reeves and Brownell, 2009) suggest that the species' distribution within inshore waters of the Solomon Islands is patchy, and it is not abundant, which is consistent with observations in other locations.

A large scale marine assessment covering the western provinces of the Solomon Islands in 2004 surveyed cetaceans for 160 hours by visual and acoustic methods, with 67 hours dedicated to coastal habitats considered to be preferable by *T. aduncus* (Kahn, 2006). In this rapid assessment covering 1228 nautical miles (2089 km), one group of *T. aduncus* was sighted off Noro Passage, near Gizo, off the north-western coast of New Georgia Island (Kahn, 2006; Kahn *pers. comm*. to Reeves, October 2008 cited in Reeves and Brownell, 2009).

Unpublished data by R. H. Defran was summarised by Reeves and Brownell (2009). Defran conducted 35 photo-identification surveys of *T. aduncus* in 2005, 2007 and 2008 across the entire north coast of Guadalcanal (east and west of Honiara) covering 160 km, the deep waters between Guadalcanal and the Florida Islands, the northern and southern borders of the Florida Islands and around Savo Island, as well as "long range" surveys of the extreme east of Guadalcanal and shores of Marau (Reeves and Brownell, 2009). Defran recorded some individuals travelling 113 km from Marau to Honiara over a 10 day period, suggesting their home range may encompass most of the northern Guadalcanal coastline (Reeves and Brownell, 2009. Defran reported that all but one sighting of *T. aduncus* had been 500-750 m offshore and in shallow water (40-50 m deep) (Reeves and Brownell, 2009).

In an interim report on the Solomon Islands Dolphin Project submitted to the 25th meeting of the Animals Committee (AC25 Inf. 11, hereafter referred to as "Oremus *et al.*, 2011"), it was reported that specimens of *T. aduncus* (36 animals), held in captivity in the Solomon Islands in November 2009 were all captured along the coast of Guadalcanal.

Population trends and status: There is no global abundance estimate for the species, and the current population trend is unknown (Hammond *et al.*, 2008). *T. aduncus* is currently listed as Data Deficient in the IUCN Red List, with the following justification: "Although the species is widespread in Indo-Pacific coastal waters and its aggregate abundance is probably in the tens of thousands in multiple local populations, habitat destruction and incidental takes (of unknown but possibly large magnitude) may have a significant impact on this species. However, the lack of available information precludes an assessment of this impact" (Hammond *et al.*, 2008).

Published population estimates and information on population trends are lacking for the Solomon Islands. However, recent surveys led by the South Pacific Whale Research Consortium (SPWRC) as part of the Solomon Islands Dolphin Project took place in November 2009 and November 2010 around four main islands of the eastern Solomon Islands: Santa Isabel, Malaita, Guadalcanal and the Florida Islands up to 1 nautical mile offshore (Oremus *et al.*, 2011). In 2442 nautical miles surveyed (1707 nm of coastal effort and 735 nm of offshore effort), thirty groups of *T. aduncus* were encountered over the two survey years (14 groups in 2009 and 16 in 2010), with 184 unique individuals photographed (Oremus *et al.*, 2011). The average group size was 7-9 individuals, but group size varied from 1-30 individuals (Oremus *et al.*, 2011). Further aerial surveys took place in July 2011, however results will not be available until the end of 2011 (Marc Oremus, *pers. comm.*, 2011).

Kahn (2006) recorded only one group of *T. aduncus* comprising 11 individuals and no calves near Gizo (off New Georgia Island) despite a relatively large survey effort of over 60 hours in 2004, indicating that the species may have a relatively low abundance in the western provinces of the Solomon Islands, at least during the survey period. Defran recorded at least 113 distinct individuals from photo-identification data, with five dolphins being recorded in all three survey years and seventeen being sighted over adjacent study years (2005 and 2007 or 2007 and 2008) (Reeves and Brownell, 2009). Forty individuals were identified by Defran more than once in the same survey trip, suggesting short- or medium-term site fidelity (Reeves and Brownell, 2009).

According to Parsons *et al.* (2010), the Solomon Islands Government presented information on previous studies of the species in support of a non-detriment finding for the 2007 exports. This indicated that 52 individuals had been located in four days of boat trips in 2005, and 46 individuals had been sighted in eight days in 2007 (seven recorded more than once), covering a total of 31 miles of coastline. Based on high recapture rates, Parsons *et al.* (2010) suggested a relatively small, resident population in the locations surveyed in 2005 and 2007, and that these data could suggest a population in the low hundreds. Similarly, Reeves and Brownell (2009) suggested a likely "small" population (i.e. in the hundreds) in the Solomon Islands, considering the restricted areas of potentially suitable habitat.

In 2009, the Solomon Islands Ministry of Fisheries and Marine Resources (*in litt.* to CITES Secretariat, 2009a) estimated a population size of 12 000-15 000 *T. aduncus.* A slightly lower population estimate was provided to delegates of AC24, along with the basis for its calculation (Ministry of Fisheries and Marine Resources, 2009b): based on local sightings of 5.8 animals per km of shoreline (species unspecified), and unpublished research by R.H Defran (as reported to the Scientific Authority) of 4.1 animal sightings per km of shoreline (species unspecified), data were extrapolated using the total Solomon Islands shoreline of 9

500 km to give a range of 38 950 to 55 100 animals (Ministry of Fisheries and Marine Resources, 2009b). This figure was amended on the basis of local knowledge that *T. aduncus* represented a quarter of all dolphin species in captures and traditional harvests, to give an estimate of 9738 to 13 775 (Ministry of Fisheries and Marine Resources, 2009b).

Parsons *et al*. (2010) described this methodology as invalid, suggesting that except for the areas surveyed, no scientific evidence was available to demonstrate species occurrence or density within the country.

T. aduncus exhibits strong year-round residency and natal philopatry (Wang and Yang, 2009). Oremus *et al.* (2011) in their study in the Solomon Islands reported nine re-sightings of individuals within the same year and 23 re-sightings between 2009 and 2010 within the study sites, suggesting some degree of site fidelity and potentially demographic closure within sites in the Solomon Islands.

Threats: Due to a preference for near-shore environments, *T. aduncus* is vulnerable to a number of threats including direct exploitation, by-catch and environmental degradation (Hammond *et al.,* 2008). Live capture and international trade for the purpose of aquarium displays was considered a major threat, given that the Solomon Islands population has not been assessed (Hammond *et al.,* 2008). According to Parsons *et al*. (2010), at least 94 live

Indo-Pacific bottlenose dolphins were captured in coastal waters of the Solomon Islands

during April-July 2003. Concern regarding live capture and previous export of specimens of *T. aduncus* from the Solomon Islands without sufficient scientific basis for a non-detriment finding has been reported by several authors, including members of the IUCN Cetacean Specialist Group (Ross *et al*., 2003; Reeves *et al*. *in litt*. to CITES Management Authorities of the Solomon Islands, 2007; Parsons *et al*., 2010).

Fishing for dolphins in the Solomon Islands was reported to be a long tradition in rural communities, however the bottlenose dolphin *T. truncatus* (presumed to include *T. aduncus* at the time of citation) was reported to be not taken as part of traditional drive hunts (Takekawa, 2000). Ross *et al*. (2003) reported that *T. aduncus* is less likely to be a victim of the drive fishery as the species teeth are not as highly valued.

In addition to impacting population sizes, removal of live dolphins from the wild was reported to disrupt long-established behavioural and social patterns of remaining animals, which could potentially affect reproductive success (Reeves and Brownell, 2009).

Wang and Yang (2009) considered the most serious anthropogenic global threat to *T. aduncus* to be mortality as a result of interactions with fisheries. There is evidence of *T. aduncus* by-catch in local fisheries (Kurihara and Oda 2007, cited in Reeves and Brownell 2009).

Additional threats to *T. aduncus* populations can include toxic effects of xenobiotic chemicals, reduced prey availability caused by environmental degradation and overfishing, direct and indirect disturbance and harassment (e.g. boat traffic and commercial dolphin watching), marine construction and other forms of habitat destruction and degradation (Hammond *et al.,* 2008). It is not known to what extent these threats affect the species within the Solomon Islands.

Trade: *T. aduncus* was listed (as part of *T. truncatus*) in CITES Appendix II on 28/06/1979. The Solomon Islands became a Party to CITES in 2007; submission of an annual report was not required until 2008. To date, no annual reports have been received from the Solomon

Islands. According to data in the CITES Trade Database submitted by trading partners, direct trade in *T. aduncus* 2000-2010 comprised 61 live, wild-sourced animals, with 33 imported in 2003 by Mexico and 28 imported in 2007 by the United Arab Emirates (UAE).

The Solomon Islands Ministry of Fisheries and Marine Resources (*in litt.* to CITES Secretariat, 2009) confirmed that the export of 74 live specimens of *T. aduncus* had taken place (Table 1). Twenty eight live specimens were exported to Mexico in 2003, 28 were exported to UAE in 2007, seven were exported to the Philippines in 2008, and a further 11 were exported to the Philippines in 2009 (Solomon Islands Ministry of Fisheries and Marine Resources, *in litt.* to CITES Secretariat, 2009). A further 18 specimens were expected to be exported to the Philippines later in that year (Solomon Islands Ministry of Fisheries and Marine Resources, *in litt.* to CITES Secretariat, 2009).

Trade records of the Environment and Conservation Division (Ministry of Environment, Conservation and Meteorology; Horokou, *in litt.* to UNEP-WCMC, 2011) (Table 1) are identical to those of the Ministry of Fisheries and Marine Resources for exports occurring in 2003 and 2007 outlined above; however reported trade differed for the years 2008 and 2009. Additional trade was reported for 2011.

Table 1. Exports of *T. aduncus* from the Solomon Islands 2003-2011 as reported by Ministry of Environment, Conservation and Meteorology (Horokou, *in litt.* to UNEP-WCMC, 2011) and the Ministry of Fisheries and Marine Resources.

Year	Number animals (Ministry of Environment, Conservation and Meteorology, 2011)	Destination	Number animals (Ministry of Fisheries and Marine Resources, 2009)	Destination
2003	28	Mexico	28	Mexico
2007	28	Dubai	28	UAE
2008	18	Singapore	7	Philippines
2009	9	Malaysia	11 (+18 expected to be exported later in the year)	Philippines
2011	25	China		

The CITES Trade Database holds no records of the trade in *T. aduncus* to the Philippines, however, neither the Philippines nor the Solomon Islands have provided an annual report for 2008. The Philippines annual report for 2009 does not include any record of imports of *T. aduncus*. Annual reports for Singapore in 2008 and Malaysia in 2009 do not contain records for any imports of live wild specimens from the Solomon Islands.

Indirect trade in *T. aduncus* originating in the Solomon Islands over the period 2000-2010 consisted of 23 live, wild-sourced animals re-exported by Mexico to the Netherlands Antilles in 2006 for the purpose of a circus or travelling exhibition (purpose 'Q'). In addition, wild-sourced scientific specimens were re-exported.

There have been no export quotas for *T. aduncus* published on the CITES website. However, in its letter to the CITES Secretariat on 22 October 2009, the CITES Management Authority of the Solomon Islands indicated the establishment of an export quota of 100 dolphins (all species), which would be subject to review as new information became available (Horokou, *in litt.* to CITES Secretariat, 2009). The quota of 100 dolphins (all species) was reported to be based on advice from the Scientific Authority (Solomon Islands Ministry of Fisheries and Marine Resources *in litt.* to CITES Secretariat, 2009), although no further details of the scientific basis were provided. According to the Solomon Islands Ministry of Fisheries and Marine Resources (*in litt.* to CITES Secretariat, 2009), annual removal of 100 specimens would represent 0.7-0.84 per cent of the population estimate of 12 000-15 000.

In response to the AC24 recommendation to set a cautious export quota in August 2008, the Cabinet of the Solomon Islands Government gave its endorsement to halve the annual export quota of *T. aduncus* from 100 to 50 animals and also endorsed that this quota be continuously reviewed (AC25 Doc. 9.5; Horokou, *in litt*. to CITES Secretariat, 2009).

Oremus *et al.* (2011) reported that the Government of Solomon Islands permits up to 40 dolphins to be exported per year for display purposes, and that to date, exports had only comprised the species *T. aduncus*.

A standard adopted by the Scientific Committee of the International Whaling Commission (IWC) stated that one per cent of an abundance estimate represents a reasonable and precautionary threshold beyond which there should be concern about sustainability of anthropogenic removals (IWC, 1996).

During discussion on trade in *T. aduncus* at a workshop held in Samoa in 2008 under the auspices of the IUCN Cetacean Specialist group (Reeves & Brownell, 2009), it was concluded that if a 1-2 per cent threshold were applied to *T. aduncus,* then intended annual level of removal by the Solomon Islands government at that time (of around 100 *T. aduncus*) was unlikely to be sustainable given the state of knowledge of Indo-Pacific bottlenose dolphins in the country, as the population would need to be in the region of 5000-10 000 individuals (Reeves & Brownell, 2009).

Management: The Government of the Solomon Islands suspended exports of wildlife in 2006 to allow for the development of regulations necessary under the Environment Act (1998) and Wildlife Protection and Management Act (1998) (Ministry of Environment Conservation and Meteorology, 2008), which was then lifted in 2007 (Parsons *et al*., 2010).

According to the Solomon Islands Ministry of Fisheries and Marine Resources (*in litt.* to CITES Secretariat, 2009), capture of dolphins requires a license which is restricted to traditional dolphin harvesting communities, and it is prohibited in certain geographical areas at certain times of the year under the Provincial Legislation and Customary (Tribal) Regulation. Export of live dolphins is allowed only for certain purposes: (a) scientific and research purposes, (b) public display and education, (c) for introduction of new genetic material, and (d) conservation, captive and breeding in captivity programs (Solomon Islands Ministry of Fisheries and Marine Resources, 2007).

Reeves and Horokou (2008) reported that there were no management measures in place to protect the species in the Solomon Islands, nor was there any monitoring of the harvest. However, the Scientific Authority of the Solomon Islands considered this document to be inaccurate, as the information had not been peer reviewed (Ministry of Fisheries and Marine Resources, 2009b).

Some progress on establishing management measures for the species appears to have been made, particularly following previous Animals Committee discussions on *T. aduncus* in the Solomon Islands. The Solomon Islands signed the Memorandum of Understanding (MoU) for the Conservation of Cetaceans and their Habitats in the Pacific Islands Region under the Convention for the Conservation of Migratory Species in 2007[1], and in doing so, agreed to endeavor to improve national conservation, reduce threats and undertake research and monitoring of cetaceans. An assessment of dolphin removals is a high priority of the

[1] http://www.pacificcetaceans.org/membership.php Accessed 9/11/11

SPREP (South Pacific regional Environment Program) Whale and Dolphin Action Plan 2008-2012 (SPREP, 2007) and the CMS MoU (Oremus *et al.*, 2011).

The IUCN Cetacean Specialist group workshop held in Samoa in 2008 addressed the scientific and technical issues relating to *T. aduncus* in the Solomon Islands (Reeves and Brownell, 2009). The workshop discussed management goals, assessment options, methods for determining population sizes and outlined a framework for assessment (Reeves and Brownell, 2009). It was concluded that the best approach to assess abundance and delineate populations would be a combination of mark-recapture analyses of photo-identification data and genetic analyses of tissue samples, and that population assessment efforts would need to increase for live-capture in the Solomon Islands to continue (Reeves and Brownell, 2009). The participants concluded that assessments could not be achieved quickly or inexpensively (Reeves and Brownell, 2009).

The Management Authority of the Solomon Islands confirmed to the Secretariat on 28 September 2009 that its Government had allocated SBD 500 000 (local currency), or approximately USD 65 000 for dolphin surveys in order to obtain sufficient information to produce a scientifically robust non-detriment finding (AC25 Doc. 9.5)[2]. A scientific research project, technically and financially supported by SPWRC, was initiated in 2009 to improve understanding of the population status and dynamics of *T. aduncus* and contribute to an assessment of the sustainability of the level of live captures (Horokou, *in litt.* to CITES Secretariat, 2009; Oremus *et al.*, 2011).

A technical committee comprising representatives of the Ministry of Fisheries and Marine Resources, Ministry of Environment, Conservation and Meteorology, Ministry of Development Panning and Aid Coordination and The Nature Conservancy had been established to arrange surveys in collaboration with SPWRC (Horokou, *in litt.* to CITES Secretariat, 2009).

The findings of these scientific surveys 2009-2011 which include photo-identification, biopsy data, and information from traders will be available at the end of 2011 (Marc Oremus, *pers. comm.,* 2011), and this data will be used to advise the Solomon Islands government on future management decisions concerning trade in *T. aduncus* (Oremus *et al.*, 2011).

A case study non-detriment finding for *T. aduncus* in the Solomon Islands presented at the NDF workshop in Mexico in 2008 concluded that "the current data available from the Solomon Islands are inadequate for a rigorous NDF assessment" (Reeves and Horokou, 2008). However, as referred to above, this document was contested by the CITES Scientific Authority of the Solomon Islands.

Referring to the surveys taking place in partnership with SPWRC, it was acknowledged by the CITES Management Authority of the Solomon Islands that "only through these surveys can the desired information to produce a robust NDF be made available" (Horokou, *in litt.* to CITES Secretariat, 2009).

Two protected areas in the Solomon Islands may offer some protection to *T. aduncus*. The Marovo Lagoon World Heritage Area located in North New Georgia in the western part of the Solomon Islands protects tropical dolphins, and at the Arnavon Islands Marine Conservation Area, a 31.9 sq mi Marine Conservation Area between Santa Isabel and Chioseul islands in the Manning Straights, dolphin sightings have been confirmed, although

[2]This was erroneously reported as USD$500,000 in document AC25 Doc. 9.5.

no studies or formal confirmation of their presence has been made (Hoyt, 2005).

D. Problems identified that are not related to the implementation of Article IV, paragraphs 2 (a), 3 or 6 (a)

The Solomon Islands became a Party to CITES in 2007 but have not yet submitted any annual reports. Records of actual exports of *T. aduncus* from the Solomon Islands appear to differ between the Ministry of Fisheries and Marine Resources and the Ministry of Environment, Conservation and Meteorology.

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***Balearica pavonina* Linnaeus 1758: Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Cote d'Ivoire, Democratic Republic of Congo, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea Bissau, Kenya, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, South Sudan, Sudan, Togo, Uganda.**

Gruidae, Black Crowned Crane.

Selection for Review of Significant Trade

At its 24th meeting, the Animals Committee included *Balearica pavonina* in the Review of Significant Trade as an urgent case (AC24 Summary Record). At the 25th meeting of the Animals Committee, as no responses from range States had been received, the following countries were retained in the Review of Significant Trade: Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Cote d'Ivoire, the Democratic Republic of Congo, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea Bissau, Kenya, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, South Sudan, Sudan, Togo and Uganda (AC25 Summary Record).

A. Summary

Overview of *Balearica pavonina* recommendations.

Range State	Provisional category	Summary
Benin	Least Concern	Very small population, with declines reported. However, fully protected in Benin and no international trade reported since 2001. On the basis of no anticipated trade, categorised as Least Concern.
Burkina Faso	Least Concern	Very small population, with declines reported. However, fully protected in Burkina Faso and no international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Burundi	Least Concern	The species does not occur in Burundi. No international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Cameroon	Least Concern	Apparently stable population, numbering several thousand individuals. Protected in Cameroon although illegal trade reported to be a threat. No international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Central African Republic	Least Concern	Small population. However, fully protected in the Central African Republic and no international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Chad	Least Concern	Relatively large population. No international trade reported 2000-2010 although illegal trade reported to be a threat. On the basis of no anticipated trade, categorised as Least Concern.
Cote d'Ivoire	Least Concern	Vagrant in the country, with low visiting numbers seasonally. However, fully protected in Cote d'Ivoire and no international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Democratic Republic of the Congo	Least Concern	No information on population size or trends. Partially protected in the Democratic Republic of the Congo and no international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.

Range State	Provisional category	Summary
Eritrea	Least Concern	Possibly vagrant, with population status and trends unknown. However, no international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Ethiopia	Least Concern	Population estimated to be several thousand individuals though trends unknown. However, fully protected in Ethiopia and no international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Gabon	Least Concern	Species may not occur in Gabon. However, no international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Gambia	Least Concern	Small population with declines reported. However, no international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Ghana	Least Concern	Very small population, with declines reported. However, protected in Ghana and no international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Guinea	Possible Concern	Small population (estimates of 25 and 200 individuals in 2004), trends unknown. Trade including illegal trade reported to be a threat. Apparently protected but export of 10 wild-sourced specimens for commercial purposes reported in 2008. The impact of current international trade levels is not known and no information was available on the implementation of Article IV, therefore categorised as Possible Concern.
Guinea Bissau	Least Concern	Relatively large population though trends unknown. No international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Kenya	Least Concern	Small population with trends not known. However, protected in Kenya and no international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Mali	Least Concern	Previously large population reported to have declined significantly. Domestic and illegal trade reported. However, protected in Mali and no international trade reported since 2001. On the basis of no anticipated trade, categorised as Least Concern.
Mauritania	Least Concern	Population of around 500 individuals with increases noted in two locations. No international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Niger	Least Concern	Estimated population size ranged from a few hundred to over 1000 birds. However, fully protected in Niger and no international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Nigeria	Least Concern	Previously large population reported to have declined significantly. Collection for trade considered to be a threat and one author reported, based on anecdotal information that some birds are sold for export. Trade in 30 live, captive-bred birds from Nigeria was reported by importers in 2005 but no trade in wild birds reported since 2006. On the basis of no anticipated trade, categorised as Least Concern.
Senegal	Least Concern	Relatively large population (>1900 based on surveys in 2001-2002). However, fully protected in Senegal and very low level international trade reported 2000-2010 (four wild birds in 2005). On the basis of no anticipated trade, categorised as Least Concern.
Sierra Leone	Least Concern	Vagrant, with population status and trends unknown. However, protected in Sierra Leone and no international trade reported

Range State	Provisional category	Summary
		2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Sudan and South Sudan		South Sudan seceded from Sudan on 9 July 2011. Available literature and data were compiled before the two countries separated. Relatively high species population for Sudan and South Sudan (approximately 25 000 individuals) with declines reported. Low level trade in wild specimens reported by importers from Sudan (prior to the secession of South Sudan), with unreported trade a potential concern. No annual reports were submitted by Sudan 2008-2010. The provenance of specimens (Sudan or South Sudan) in trade is not known.
	Possible Concern	**Sudan**: Although reported trade is low relative to population size, unreported trade considered of concern by several authors and impact of total international trade levels not known. Trade in 2010 was reported by importers. It is not clear whether the provisions of Article IV are being implemented, therefore categorised as Possible Concern.
	Possible Concern	**South Sudan**: The country does not yet appear to have a scientific institution capable of advising that an export is not detrimental to the survival of the species. It is not clear whether trade is anticipated and whether the provisions of Article IV are being implemented, therefore categorised as Possible Concern.
Togo	Least Concern	Small population with declines reported. No international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Uganda	Least Concern	Vagrant, with low visiting numbers seasonally. No international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.

B. Species overview

Biology: *Balearica pavonina* (the Black Crowned Crane) is an African waterbird that typically inhabits open land near inland water bodies (Mackworth-Praed and Grant, 1952). Its preferred habitats include freshwater marshes, wet grasslands and the edges of lakes, ponds and rivers (del Hoyo *et al.*, 1996). According to Williams *et al.* (2003), the species showed both year-round residential and locally migratory behaviour, forming large flocks during the dry season and moving from large permanent wetlands to smaller temporary wetlands to breed during the rainy season.

B. pavonina was reported to be omnivorous, with a diet consisting of grain crops, plants, invertebrates and small vertebrates (Williams *et al.*, 2003). Aynalem (2011) reported that *B. pavonina* frequently caused crop damage.

The species was reported to nest on the ground in open but shallow marshes with high sedges and grasses (Meine and Archibald, 1996). Clutches were reported to consist of one to five, but most commonly two or three eggs (Walkinshaw, 1964). The young can fly at about 3 months of age, but stay with the parents until their seventh to ninth month (Walkinshaw, 1964).

Taxonomic note: *B. pavonina* closely resembles the Grey Crowned Crane (*B. regulorum*), which occurs in Eastern and Southern Africa (Dickinson, 2003). In the past, the two species

were considered to form a single species (*B. pavonina*, Johnsgard, 1983) but they have been considered separate species by both the current and former CITES Standard references for birds (Sibley and Monroe, 1990; Dickinson, 2003).

General distribution and status: *B. pavonina* was recorded to occur from Senegal and Gambia on the Atlantic Coast of Africa to the upper Nile River basin in Sudan and Ethiopia (Walkinshaw, 1964; Dickinson, 2003).

In 2000 and 2001, range-wide surveys of the species were undertaken at 187 sites in 20 African countries, leading to a total population estimate of approximately 42 000 individuals; this was lower than the previous 1994 estimate of 65 500-77 500 individuals (Williams *et al.,* 2003).

Population declines were reported by Meine and Archibald (1996), Williams *et al.* (2003) and Diagana *et al.* (2006). *B. pavonina* was categorised as Vulnerable in the IUCN Red List on the basis of a rapid population decline which is predicted to continue into the future, primarily due to habitat loss and trapping for domestication or illegal international trade (BirdLife International, 2011a).

Threats: Several authors reported the key threat facing *B. pavonina* to be the degradation and loss of its habitat, including use of wetlands for agriculture, or extraction of water for irrigation (Meine and Archibald, 1996; Williams *et al.,* 2003). The removal of *B. pavonina* from the wild for domestication and trade, including illegal trade, was considered to form a further important threat to the species (Beilfuss *et al.*, 2007; R. Beilfuss, *pers. comm.* to UNEP-WCMC, 2011; Kone *et al.,* 2007; International Crane Foundation, 2009; Morrison, 2006; Morrison *et al.*, 2007; K. Morrison, *in litt.* to UNEP-WCMC, 2011). The species was reportedly either trapped, or its eggs and chicks were removed from the nests to raise individuals in captivity and sell them on the local, regional, or international market (Meine and Archibald, 1996; BirdLife International, 2011a; K. Morrison *in litt.* to UNEP-WCMC, 2011). The species was reported to be highly prized in private collections (K. Morrison, *in litt.* to UNEP-WCMC, 2011).

In some areas, cranes were reported to be hunted for meat (Meine and Archibald, 1996; BirdLife International, 2011b). Overhead power line collisions, indiscriminate pesticide application and political instability were also reported to pose a threat to *B. pavonina* (K. Morrison, *in litt.* to UNEP-WCMC, 2011).

Captive cranes were reported to be in general short-lived and prone to diseases and injury, and their breeding success was considered 'very low' (International Crane Foundation, 2011). Morrison (2007) conducted a preliminary assessment of the African crane studbooks, concluding that none of the captive populations were viable, and that the birds were rarely able to breed due to lack of suitable breeding areas and high vulnerability to predation. It was also noted that hybridisation was common when breeding did occur (Morrison, 2007). A study of *B. pavonina* in Mali showed that the species did not breed successfully under given captive conditions (Kone *et al.*, 2007).

Overview of trade and management: *B. pavonina* was listed in CITES Appendix II on 01/08/1985. International trade over the period between 2000 and 2010 consisted principally of live birds, with small quantities of bodies, skins, feathers, trophies and scientific specimens also reported in trade. The majority of trade involved wild-sourced birds, with trade in captive-bred specimens also reported. Trade was primarily for commercial purposes, with live animals also traded for breeding in captivity, as personal possessions and, to a lesser extent, for zoos, circuses or travelling exhibitions, education, and scientific purposes.

In total, in the period between 2000 and 2010, trade in 600 live birds was reported by exporters of which 505 were wild-sourced; the corresponding trade reported by importers involved 791 live birds of which 529 were wild-sourced. The main range State exporting the species was Sudan.

Ongoing conservation programmes were reported to include sustainable management of freshwater wetlands, mangroves and rice fields in coastal West Africa (Beilfuss *et al.*, 2007), as well as a series of intensive management workshops relating to the species sponsored by IUCN/SSC Conservation Breeding Specialist Group, the recommendations of which are recorded in the Crane Conservation Assessment and Management Plan (CAMP).

C. Country reviews

BENIN

Distribution in range State: The species was listed as breeding in the country (BirdLife International, 2011b), occurring in the far north, within the floodplains of the Oti and Pendjari rivers (north-western Benin), including W du Niger National Park and Pendjari National Park (Williams *et al.*, 2003).

Population trends and status: In 1994, the total population in Benin was believed to be less than 50 individuals (Meine and Archibald, 1996; Urban, 1996). In surveys conducted in 2000 and 2001, Williams *et al.* (2003) estimated the population size to be >20 individuals. Williams *et al.* (2003) considered the population to be in decline, and noted that the species was no longer occurring in places where it had earlier been common.

The population in 2004 was estimated to be 50 individuals (Beilfuss *et al.*, 2007).

Threats: No information was located.

Trade: According to data in the CITES Trade Database, between 2000 and 2010 trade comprised the export of 10 live, wild-sourced birds for commercial purposes as reported by Benin in 2001. Annual reports from Benin have been received for all years except 2003 and 2006.

Management: *B. pavonina* was listed as a fully protected species under Annex I of the law No 87-014 (1987) regulating nature protection and hunting in Benin (République Populaire du Benin, 1987). The law banned hunting or capture of the species, with the exception of self defence or permits given for scientific purposes (République Populaire du Benin, 1987). The species occurs in a number of protected areas (see distribution section above).

BURKINA FASO

Distribution in range State: The species was listed as breeding in the country (BirdLife International, 2011b). The main areas of occurrence were reported to be Sahel Partial Faunal Reserve at Mare d'Oursi (northern Burkina Faso), Kabore Tambi National Park at Southern Upper Volta (southern Burkina Faso), and Arly Partial Faunal Reserve Pama Reserve at Oti-Pendjari Basin (south-eastern Burkina Faso) (Williams *et al.*, 2003).

Population trends and status: In the 1970s, the population in the Upper Volta was estimated at 1400–1500 individuals by students of the School of Training for Wildlife Specialists, Garoua, Cameroon (Fry, 1983). By 1985 it was reported to have declined to about 100 individuals (Urban, 1988) and, based on surveys conducted by Williams *et al.* (2003) in 2000 and 2001, was estimated at >10 individuals. For the sites surveyed by

Williams *et al.* (2003), population trends were unknown. Beilfuss *et al.* (2007) estimated the population size in 2004 was approximately 50 individuals.

Threats: According to Tréca (1996b), the human population had increased significantly in Mare d'Oursi, and the area had become intensively cultivated, decreasing the suitable habitat for *B. pavonina*. It was also reported that young birds were captured by villagers in the Kantchari-Macalondi area before they were able to fly (Fry, 1983).

Trade: According to data in the CITES Trade Database, no trade in *B. pavonina* from Burkina Faso was reported between 2000 and 2010. All annual reports have been received from Burkina Faso.

Management: *B. pavonina* was listed as a fully protected species under Annex I of the Decree No 96-061 (1996) on the exploitation of wildlife (Burkina Faso, 1996). The species occurs in a number of protected areas (see distribution section above).

BURUNDI

Distribution in range State: The CITES SA of Burundi (J. Rushemeza, *pers. comm.* to UNEP-WCMC, 2011) did not consider the country as a range State, and several authors indicated that the southernmost border of the distribution of the species was northern Uganda and Kenya (Williams and Arlott, 1980; Backhurst *et al.*, 1980; Meine and Archibald, 1996; Dickinson, 2003; Williams *et al.*, 2003; Diagana *et al.*, 2006; BirdLife International, 2011a). A report by Ndabirorere (1999) listed *B. pavonina* as an endangered species in the country, but it is likely this was an error, possibly referring to *B. regulorum*, which does occur in Burundi.

Population trends and status: No information was located.

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade in *B. pavonina* from Burundi was reported between 2000 and 2010. Burundi has not yet submitted annual reports for 2009 or 2010.

Management: The Burundi regulations for Hunting and the Protection of Animals (1971) specified the need for valid hunting licences (Burundi, 1971). *B. pavonina* was not listed as a protected species in the country (Burundi, 1971).

CAMEROON

Distribution in range State: The species was listed as breeding in Cameroon (BirdLife International, 2011b), occurring in the north of the country on the floodplains of the upper Benue river in the North region and along the Logone River, Waza-Logone floodplain, Kalamaloué Forest reserve, Lake Chad and Lake Maga in the Extreme North region (Williams *et al.*, 2003; J. Rushemeza, *pers. comm.* to UNEP-WCMC, 2011).

Population trends and status: The total population was estimated at 2000 individuals in 1985 (Urban, 1988), 2000-3500 in 1994 (Urban, 1996), more than 3000 in 2001 (Williams *et al.*, 2003) and 3000 in 2004 (Beilfuss *et al.*, 2007). The Waza-Logone floodplain was believed to be one of the strongholds of the species, with 1348 individuals counted in 2000 and 1502 individuals in 2001 (Williams *et al.*, 2003). The total population of this area was reported to range between 2500-3000 individuals from year-to-year, with exact numbers depending on the movement of birds throughout the Lake Chad basin (Williams *et al.*, 2003).

Threats: According to the CITES Scientific Authority of Cameroon (E. Battokok, *pers. comm.* to UNEP-WCMC, 2011), the main threat to the species was the conversion and degradation of wetland habitats. Egg collection, nest disturbance, bush fires, subsistence hunting and domestication were considered as further threats to the species (E. Battokok, *pers. comm.* to

UNEP-WCMC, 2011). Tursha and Boyi (2011) considered trade between Chad, Cameroon and Nigeria as a main threat to the species.

Trade: According to data in the CITES Trade Database, no trade in *B. pavonina* from Cameroon was reported between 2000 and 2010. Annual reports from Cameroon have not been received for 2003, 2008 or 2010.

Tursha and Boyi (2011) reported evidence of cross border illegal trade between Chad, Cameroon and Nigeria. They called for assessments on the nature of that trade and stronger law enforcement along the borders (Tursha and Boyi, 2011).

Management: *B. pavonina* was listed as a Class A protected species under Law No. 94/01 on forestry, wildlife and fisheries regulations (Republic of Cameroon and Ministry of Forestry and Wildlife, 1994; Djeukam, 2007). The killing of these species was banned, except as self defence or when protecting property, such as livestock or crops (Republic of Cameroon and Ministry of Forestry and Wildlife, 1994). It was reported that permits were needed for the capture of *B. pavonina* and for keeping it in captivity (Djeukam, 2007).

CENTRAL AFRICAN REPUBLIC

Distribution in range State: The species was listed as breeding in the country (BirdLife International, 2011b), with information on its distribution sparse (Beilfuss et *al.,* 2007). The range map produced by BirdLife International (2011a) indicated that the species occurred along the northern border of the country. Populations were reported to occur on the floodplains of the River Chari and St Floris National Park (northern Central African Republic), and floodplains of rivers rising from the Massif des Bongo and flowing towards Chad, including André Felix National Park (north-eastern Central African Republic) (Williams *et al*., 2003).

Population trends and status: In 1985 and 1995, the population size was estimated to be several hundreds of individuals (Urban 1988; Meine and Archibald, 1996). Based on surveys conducted in 2000 and 2001, the population was estimated to be approximately 500 individuals (Williams *et al*., 2003), and a similar estimate was provided by Scholte *et al.* (2000). In 2004, the estimated the population size was 500 individuals (Beilfuss *et al.,* 2007).

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade was reported between 2000 and 2010. Annual reports from the Central African Republic have not yet been received for 2004 or 2008.

Management: *B. pavonina* was listed as a fully protected species under Annex II of the Ordinance no 84/045 on wildlife protection and hunting regulations (Direction de la Faune et des Aires protégées, 2009). The Ordinance banned all hunting and capture of the species (Direction de la Faune et des Aires protégées, 2009). The species occurs in a number of protected areas (see distribution section above).

CHAD

Distribution in range State: The species was listed as breeding in the country (BirdLife International, 2011b) and reported from seasonal floodplains, swamps and lake areas along the Logone and Chari River (south-western Chad), at Lake Fitri (central Chad), floodplains at Bahr Aouk including Zakouma National Park and Bahr Salamat Faunal Reserve and Lake Iro (southern Chad), and Lake Chad (western Chad) (Williams *et al.,* 2003).

Population trends and status: Based on surveys conducted during 2000 and 2001, the population was estimated to be >5500 individuals (Williams *et al*., 2003). Beilfuss *et al.* (2007) estimated the population size to be 5500 individuals in 2004, and according to Tursha and Boyi (2011), it was at least 5000.

Williams *et al.* (2003) counted c. 1400 individuals from various localities during surveys in 2000 and 2001, including 440 at Lake Fitri, 300 at Lake Chad, and 400 in the Logone river valley at Bongor Ndjamena. Population trends for the sites surveyed were unknown (Williams *et al.,* 2003).

Threats: Williams *et al*. (2003) noted that there were scattered reports of cranes being trapped for pets. Tursha and Boyi (2011) considered trade between Chad, Cameroon and Nigeria as a significant threat to the species. Tréca (1996b) considered cattle ranching, intensive agriculture and disturbances to the country's protected area network as a result of the civil war as threats to the species in Chad.

Trade: According to data in the CITES Trade Database, no trade was reported between 2000 and 2010. Annual reports have not been received from Chad for 2005, 2009 or 2010.

Tursha and Boyi (2011) reported evidence of cross border trade between Chad, Cameroon and Nigeria, with possible exports to the latter.

Management: The Ordinance No. 14-63 (1963) on hunting and nature protection, which applies to all animals, prohibits hunting without and permit and lists the requirements for permits depending on the purpose of hunting (Chad Ministere de l'Information et du Tourisme, 1963). *B. pavonina* was not included in the list of protected species in the country (Chad Ministere de l'Information et du Tourisme, 1963). The species occurs in a number of protected areas (see distribution section above).

CÔTE D'IVOIRE

Distribution in range State: The species was listed as vagrant but breeding in the country (BirdLife International, 2011b). It was found seasonally in wetlands of the northern savannah regions, namely Odienne, Korhogo, and Parc National de la Comoé (Williams *et al*., 2003).

Population trends and status: The species occurs seasonally in northern Côte d'Ivoire (Williams *et al.,* 2003). The population in 2004 was estimated to be less than 30 individuals (Beilfuss *et al*., 2007) and the population in the Region d'Odienne was disappearing (Williams *et al*., 2003).

Threats: Williams *et al.* (2003) noted that the tree (*Acacia nilotica*), which is used for roosting, had disappeared from many sites due to utilization as firewood or building material.

Trade: According to data in the CITES Trade Database, between 2000 and 2010 no trade from Côte d'Ivoire was reported. The CITES Management Authority (J. Zouzou, *pers. comm.* to UNEP-WCMC, 2011) reported that there was no significant trade of *B. pavonina* in the country. Annual reports from Côte d'Ivoire have not been received for 2006 or 2010.

Management: *B. pavonina* was listed as a fully protected species under Annex I of the Law 94-442 (1994), which was an amendment to Law No. 65-255 on wildlife protection and hunting (Republique de Côte d'Ivoire, 1994). The Law prohibited hunting and capture of the species, including chicks and eggs, but specified that permits may be acquired for capture for scientific purposes (Republique de Côte d'Ivoire, 1994). The species occurs in at least one protected area (see distribution section above).

DEMOCRATIC REPUBLIC OF THE CONGO

Distribution in range State: According to several authors, reports of populations in close proximity to the borders of the country suggested the presence of a significant population in the northern part of the country (Meine and Archibald, 1996; Urban, 1996; Williams *et al.*, 2003). Williams *et al.* (2003) suggested that the country may harbour several important sites for the species. Beilfuss *et al.* (2007) considered the species an occasional visitor, and Lepage (2011) listed it as rare or accidental in the country.

Population trends and status: No population estimates were available for Democratic Republic of Congo (Williams *et al.*, 2003; Beilfuss *et al.*, 2007).

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade from the Democratic Republic of the Congo was reported between 2000 and 2010. With the exception of 2010, all annual reports have been received from the country.

Management: *B. pavonina* was listed as a partially protected species (Republique Democratique du Congo, 2006), and may be hunted with authorization (Journal Officiel de la République Démocratique du Congo, 2005). The Hunting Law of 1982 specified the need for permits depending on the purpose of hunting (Journal Officiel de la Republique du Zaire, 1982).

ERITREA

Distribution in range State: The species breeds in the country (BirdLife International, 2011b), occurring in the south-western and central regions (BirdLife International, 2011a). Beilfuss *et al.* (2007) considered the species as vagrant in Eritrea.

Population trends and status: No population estimates were available for Eritrea and population trends are unknown (Williams *et al.*, 2003; Beilfuss *et al.*, 2007). During surveys conducted in 2000 at Asmera (central Eritrea), Williams *et al.* (2003) did not observe any individuals.

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade from Eritrea was reported between 2000 and 2010. Annual reports have not yet been received from Eritrea for 2006, 2009 or 2010.

Management: According to the Eritrean Regulations for the issuance of wildlife permits (2006), the hunting, capture and export of wildlife were only allowed with permits or licences issued by the relevant authorities (Eritrea, 2006b). *B. pavonina* was not listed as a threatened species requiring special attention under the Annexes of proclamation No. 155/2006 on forestry and wildlife conservation and development (Eritrea, 2006a).

ETHIOPIA

Distribution in range State: The species breeds in the country (BirdLife International, 2011b), occurring in the western highlands, the western parts of the country and the Rift Valley lakes and rivers (Tursha and Boyi, 2011). It has been found in Lake Tana (north-western Ethiopia), Fincha Dam on the Blue Nile (western-central Ethiopia), floodplains and swamp areas in Gambella National Park (western Ethiopia), and lakes in the Southwest Rift Valley (southern Ethiopia) (Williams *et al.*, 2003).

Population trends and status: Urban (1988; 1996) and Meine and Archibald (1996) estimated the total population size to be a few thousand individuals. Based on surveys conducted in 2000 and 2001, the population was estimated to be more than 2500 individuals with

population trends unknown (Williams *et al.*, 2003). Beilfuss *et al.* (2007) estimated a population size of 2500 in 2004. The CITES Management Authority of Ethiopia *(*F. Debushe, *in litt.* to UNEP-WCMC, 2011) reported that in censuses conducted between January and February in 2011 in the twenty-six major wetland sites of the country, a total of 461 individuals were recorded.

Lake Tana was believed to be one of the strongholds of the species (Williams *et al.,* 2003).

Threats: The loss of wetland habitats was considered to be the main threat to the species in Ethiopia (F. Debushe, *in litt.* to UNEP-WCMC, 2011; Williams *et al.,* 2003).

Trade: According to data in the CITES Trade Database, no trade from Ethiopia was reported between 2000 and 2010. Annual reports have not been received from Ethiopia for 2008 or 2009. The CITES MA of Ethiopia reported no evidence of illegal trade of the species in Ethiopia *(*F. Debushe, *in litt.* to UNEP-WCMC, 2011).

Management: According to the CITES MA of Ethiopia, *B. pavonina* is fully protected in the country, "although this protection is often ineffective" *(*F. Debushe, *in litt.* to UNEP-WCMC, 2011). The Ethiopian Wildlife Development, Conservation and Utilization Council of Ministers Regulation No. 163/2008 did not include *B. pavonina* in the 'list of birds to be allowed for Hunting by Foreign Tourists and Resident Hunters' *(*F. Debushe, *in litt.* to UNEP-WCMC, 2011). The species occurs in at least one protected area (see distribution section above).

GABON

Distribution in range State: The species was not listed for Gabon by BirdLife International (2011b). A sighting of the species in Gabon, referring to a migratory individual, was reported by Dowsett and Dowsett-Lemaire (1993). Meine and Archibald (1996) considered it resident in the country, and Lepage (2011) listed *B. pavonina* in his Gabon checklist of birds.

Population trends and status: Meine and Archibald (1996) considered the population in Gabon to be less than 1000 individuals; more recent surveys conducted during 2000 and 2001 questioned whether the species occurred in the country (Williams *et al.*, 2003).

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade from Gabon was reported between 2000 and 2010. With the exception of 2006, all annual reports have been received from Gabon.

Management: Law No. 115/PR/MAEFDR (1981) prohibited the killing or capturing of any wildlife, except with permits issued by the relevant authority (Gabon, 1981).

GAMBIA

Distribution in range State: The species breeds in the country (BirdLife International, 2011b) and has been recorded on the banks of the Gambia River and its surroundings in west and central Gambia (Williams *et al.*, 2003).

Population trends and status: The population size was estimated to be c. 500 individuals by Dowsett and Dowsett-Lemaire (1993) and 100 individuals by Urban (1996). Based on surveys conducted in 2000 and 2001, Williams *et al.* (2003) estimated the population at over 100 individuals. For the sites surveyed, population trend was declining, with the exception of the Samba-Soto Swamp (central Gambia) (Williams *et al.*, 2003). Beilfuss *et al.* (2007) estimated a population size of 100 individuals in 2004.

Barlow and Wacher (1997) reported it as "locally frequent to common […] at a few regular and well known sites" with occasional sightings in other areas. Gore (1990) considered the species to be an uncommon resident.

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade from Gambia was reported 2000-2010. With the exception of 2010, all annual reports have been received from Gambia.

Management: The Wildlife Conservation Act No. 36 of 1978 did not include *B. pavonina* in the list of species for lawful hunting under Schedule III (The Republic of the Gambia, 1978).

GHANA

Distribution in range State: The species occurs in the northeast, including the Lower and Southern Upper Volta River in northern Ghana and the Oti-Pendjari Basin (northeast Ghana) (Williams *et al.*, 2003). Grimes (1987) suspected any southern records referred to individuals escaped from captivity.

Population trends and status: Urban (1988; 1996) estimated the population at 50 individuals. Based on surveys conducted 2000 and 2001, Williams *et al.* (2003) estimated the population to exceed 20 individuals. For the site surveyed (Volta Basin), population trend was reported to be declining (Williams *et al.*, 2003). Beilfuss *et al.* (2007) estimated the population size in 2004 at less than 50 individuals.

Grimes (1987) considered the species to be an uncommon non-breeding visitor in the north during the dry season, and stated that it used to be more common. *B. pavonina* appeared to be declining very rapidly in Ghana and few individuals appeared to remain in the wild (Tréca, 1996b).

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade from Ghana was reported 2000-2010. With the exception of 2006, all annual reports have been received from Ghana.

Management: *B. pavonina* was listed under the First Schedule of the Wildlife conservation regulations of 1971, prohibiting the hunting and capturing of the species (Ghana, 1971).

GUINEA

Distribution in range State: The species was listed as breeding in the country (BirdLife International, 2011b). Williams *et al.* (2003) indicated populations in Guinea at the Upper Gambia River and in freshwater swamps and rice fields in the upper west of Guinea e.g. at Iles Tristao-Kadiene.

Population trends and status: Based on surveys conducted in 2000 and 2001, Williams *et al.* (2003) estimated the total population size at less than 25 individuals. For the sites surveyed, population trend was unknown (Williams *et al.*, 2003). The authors noted that several Crane Areas, including Northwest Guinea, are seasonal sites that did not support any cranes during the survey period. Beilfuss *et al.* (2007) gave an estimate of 200 individuals for the country for 2004.

Threats: The capture of live individuals for export to international private markets was reported to be a particularly significant problem in Guinea (R. Beilfuss, *pers. comm.* to UNEP-WCMC, 2011). Illegal trade was reported by Clemmons (2003, cited in Beilfuss *et al.*, 2007) and K. Morrison (*in litt.* to UNEP-WCMC, 2011).

Trade: According to data in the CITES Trade Database, between 2000 and 2010 Guinea reported the export of 73 live, wild-sourced birds for commercial purposes (Table 1).

Importers reported slightly higher figures. Annual reports have not been received from Guinea for 2007 or 2009. Overall, trade in *B. pavonina* from Guinea decreased between 2001 and 2010, with no trade reported in 2010. No re-exports of *B. pavonina* originating in Guinea was reported over the period 2000-2010.

Table 1. Direct exports of *Balearica pavonina* from Guinea, 2000-2010. All trade was in live specimens. (No trade was reported in 2000 or 2010).

Source	Reported by	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
C	Exporter										
	Importer									4	4
W	Exporter	50		13					10		73
	Importer	50	25		10						85

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Guinea published export quotas of 50 live specimens in each year 2001-2003. This quota was apparently reached, but not exceeded, in 2001.

K. Morrison (*in litt.* to UNEP-WCMC, 2011) referred to reports that captured individuals of *B. pavonina* were readily available from Guinea, although the author noted that these were unsubstantiated. Around 20 individuals were imported illegally into South Africa in December 2011, with unconfirmed reports that they originated in Guinea (K. Morrison *in litt.* to UNEP-WCMC, 2011). It was noted that due to low population levels and significant trade exports, "the population is either in significant decline or cranes are imported illegally from neighbouring countries for export" (K. Morrison, *in litt.* to UNEP-WCMC, 2011).

Management: *B. pavonina* was listed under Annex I of the Wildlife law (1999), banning the hunting, capture, egg collection and export of the species except for permits given for scientific purposes (Republique de Guinee, 1999).

GUINEA BISSAU

Distribution in range State: The species was listed as breeding in the country (BirdLife International, 2011b). In 2002/2003, a previously largely undetected subpopulation was reported from lowland areas inundated by the Mansoa and Corubal rivers near the Atlantic coast (Williams *et al.*, 2003; Diagana *et al.*, 2006).

Population trends and status: Williams *et al.* (2003) referred to surveys by the AfWC which indicated a substantial population in the country, estimated to be over 1500 individuals. Population trends in the Mansoa and coastal region were unknown (Williams *et al.*, 2003). Beilfuss *et al.* (2007) estimated the population size in 2004 at 1500 individuals.

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade from Guinea Bissau was reported 2000-2010. Annual reports have not been received for 2008, 2009 or 2010.

Management: *B. regulorum* was not listed as a protected species in Appendix I of the Decree No 40.040 (1955) on the Protection of Land, Flora and Fauna (Ministério do Ultramar, 1955). It is not known whether more recent legislation has been published.

KENYA

Distribution in range State: The species was listed as breeding in the country (BirdLife International, 2011b) and reported from northeastern Kenya, and along the shores of Lake Turkana south to Lowarangak and Ileret (Backhurst *et al.*, 1980; Williams *et al.*, 2003).

Population trends and status: The population was estimated at a few hundred individuals by Urban (1988; 1996). Based on surveys conducted in 2000 and 2001, Williams *et al.* (2003) gave an estimate of more than 10 individuals with an unknown trend for the Lake Turkana population. Beilfuss *et al.* (2007) estimated the population size in 2004 to be 250 individuals.

Threats: Studies in western Kenya found that hunting the species for food caused about 15 per cent of the total mortality in the population of *B. regulorum* (Gichuki, 1996).

Trade: Capture of the species for export was reported from the country (Mafabi, 1992, cited in Olupot *et al.*, 2009). However, according to data in the CITES Trade Database, no trade in *B. pavonina* from Kenya was reported 2000-2010. Annual reports have not been received for 2003.

Management: The Wildlife Conservation and Management Act of 1976 (amended in 1989) declared *B. pavonina* a protected animal in Kenya, along with all other birds that were not classified as game animals. The Wildlife Act also specified that permits/licenses were needed for the ownership of live animals and trophies and the export of live protected animals.

MALI

Distribution in range State: The species was listed as breeding in the country (BirdLife International, 2011b), and was recorded from the central and southern areas, including the Inner Niger Delta (central Mali), Mid Niger River Basin (southeastern Mali) and the Lower Bafing Valley (southwestern Mali) (Williams *et al.*, 2003).

Population trends and status: Urban (1988) estimated a total population of 7000 – 8000 individuals in 1985. By 1994, the population was reported to have decreased to 3000 – 3500 individuals (Urban, 1996). Based on surveys conducted in 2000 and 2001, the population size was estimated to be just over 600 individuals and appeared to be "crashing rapidly" (Williams *et al.*, 2003). For the sites surveyed, population trend was reported to be declining, with the exception of Sibo Niala (increasing) and Senou (unknown) in south-western Mali (Williams *et al.*, 2003). Beilfuss *et al.* (2007) estimated a population size of 100 individuals for 2004.

Threats: In a study based on interviews and field surveys in the Inner Niger Delta region in 2001, Kone *et al.* (2007) reported illegal trade and considered that continued capturing of *B. pavonina* could lead to its extinction in Mali. The number of cranes in captivity was considered to exceed the number in the wild (Kone *et al.*, 2007).

Indirect threats were reported to include droughts, increasing human population, and agricultural expansion, particularly of subsistence millet in wetland areas (Tréca, 1996b).

Trade: According to data in the CITES Trade Database, trade from Mali over the period 2000-2010 comprised the export of 15 live, captive-bred birds for commercial purposes in 2001; this trade was reported by both Mali and by the importer. Re-exports of *B. pavonina* originating in Mali over this period consisted of 10 live, captive-bred birds as reported by re-exporters. All annual reports have been received from Mali for the period 2000-2010.

Kone *et al.* (2007) reported that trade in cranes was extremely common in Mali and that between 1998 and 2000, 524 individuals were captured in the Mopti, Tenenkou and Youwarou areas [Central Mali], within a region where only about 1500 wild individuals were thought to live (Kone *et al.*, 2007). Most individuals were reportedly obtained as chicks and reached the highest value per bird of any waterbird on the market (Kone *et al.*, 2007).

Management: *B. pavonina* was listed as a fully protected species in Law No. 95-031 on the management of wildlife and habitats. However, interviews conducted by Kone *et al.* (2007)

revealed that few crane owners were aware of the legislation. The authors reported that the National Directorate for the Preservation of Natural Reserves had made *B. pavonina* exports from Mali illegal in 1998, however, exports had continued, albeit limited by the high costs of transportation and taxes.

MAURITANIA

Distribution in range State: The species was listed as breeding in the country (BirdLife International, 2011b), and was recorded from the southeast, south, and southwest (BirdLife International, 2011a). The CITES Management Authority of Mauritania (M. Daddah, *in litt.* to UNEP-WCMC, 2011) reported large concentrations of the species from the lower delta (southwestern Mauritania) and East. Williams *et al.* (2003) reported populations from Gâat Mahamouda (southeastern Mauritania), and the lower Senegal River basin including the Diawling National Park (southwestern Mauritania).

Population trends and status: Estimates from 1985 and 1995 suggested population numbers of about 200 individuals (Urban, 1988; 1996). In surveys conducted in 2000 and 2001, Williams *et al.* (2003) estimated the total population to be more than 525 individuals, and reported increasing population trends for two of the four surveyed populations and unknown trends for the other two populations. Beilfuss *et al.* (2007) estimated a population size of 500 individuals in 2004. The CITES MA of Mauritania (M. Daddah, *in litt.* to UNEP-WCMC, 2011) reported that the largest subpopulation of 200-300 individuals was found in the Lake Tichilit, Diawling National Park and south of Keur Macéne.

Threats: The CITES MA of Mauritania (M. Daddah, *in litt.* to UNEP-WCMC, 2011) reported that the species was threatened by habitat loss, but did not consider hunting as a serious threat. According to Tréca (1996b), Mauritania's wetlands were at risk from drought and increasing human use, including irrigation.

Trade: According to data in the CITES Trade Database, no trade from Mauritania were reported between 2000 and 2010. No annual report has been received for 2010. The CITES MA of Mauritania (M. Daddah, *in litt.* to UNEP-WCMC, 2011) reported there was no evidence of legal or illegal trade of the species from Mauritania.

Management: *B. pavonina* was not included in the list of protected species in Law No. 97-006 on hunting and conservation.

NIGER

Distribution in range State: The species was listed as breeding in the country (BirdLife International, 2011b). Williams *et al.* (2003) reported populations in the Mid Niger River Basin (south-western Niger), Ader (e.g. Tahoura and Abalak), Zindern Damergou-Damagaram (southern Niger), and Diffa in Mandaram-Manga and Lake Chad (south-eastern Niger).

Population trends and status: Estimates from 1985 and 1995 suggested population numbers of several hundreds and over a thousand individuals (Urban, 1988; 1996). In surveys conducted in 2000 and 2001, Williams *et al.* (2003) estimated the total population to be more than 300 individuals. For the sites surveyed, population trend was reported to be mostly unknown or disappearing, with the exception of Kokorou, Tillabery (increasing) (Williams *et al.*, 2003). Beilfuss *et al.* (2007) estimated a population size of 1300 individuals in 2004. Tréca (1996b) noted that only very few breeding pairs could be found along the Nigerian border to the southwest and to the east.

Threats: Tréca (1996b) reported that *B. pavonina* was captured in the Magaria area south of Zinder (southern Niger) by people crossing the border between Nigeria and Niger.

Trade: According to data in the CITES Trade Database, no trade from Niger was reported 2000-2010. Annual reports have been received from Niger for all years 2000-2010.

Management: *B. pavonina* was classified as a fully protected animal species according to the law on hunting and wildlife protection No. 98-07. Tréca (1996b) considered that protection in most wetlands was insufficient and reported that hunting and capture, although illegal, was still taking place on a small scale.

NIGERIA

Distribution in range State: The species was listed as breeding in the country (BirdLife International, 2011b). Williams *et al.* (2003) reported populations in the Niger-Sokoto system (northwestern Nigeria), the upper Benue River (eastern Nigeria) and Lake Chad (northeastern Nigeria).

Population trends and status: Nigeria was once considered a stronghold of the species (Archibald and Pasquier, 1983). *B. pavonina* was considered to be very common in the 1970s, with a total population of about 15 000 individuals (Fry, 1981; Fry, 1983; Mustafa and Durbunde, 1992; Kone *et al.*, 2007). Later estimates showed significant decreases (Diagana *et al.*, 2006). Urban reported 'a few hundred' individuals in 1985 (Urban, 1988) and less than a hundred in 1994 (Urban, 1996). Williams *et al.* (2003) estimated the total population at more than 20 individuals and noted that birds were disappearing from the few remaining sites. Kone *et al.* (2007) reported that the species was extinct in three out of four areas where it used to be common and that it had become highly localised elsewhere, threatened with the risk of national extinction. Elgood (1982) listed the species as a "still not uncommon resident", but reported a decrease in the frequency of larger flocks.

Some authors suggested that the dramatic decline of *B. pavonina* across Nigeria may be caused in part by emigration of individuals to Chad, but no clear evidence was available to substantiate this theory (Urban, 1996; Williams *et al.*, 2003).

Threats: The trade in live animals was considered to be the major cause of population decline (Tursha and Boyi, 2011). R. Beilfuss (*pers. comm.* to UNEP-WCMC, 2011) considered the capture of live individuals primarily for export to be a particularly significant problem in Nigeria. Elgood *et al.* (1994) reported that *B. pavonina* was severely affected by hunting and trapping, which had resulted in virtual elimination of the species in the country.

Trade: According to data in the CITES Trade Database, direct exports reported by Nigeria between 2000 and 2010 consisted of two wild-sourced, live birds traded as personal possessions in 2006; this trade was not confirmed by the importer. Trade reported by the importers comprised 30 live, captive-bred birds imported in 2005 for commercial purposes and two live, captive-bred birds imported in 2002 for the purpose of breeding in captivity. This trade was not confirmed by Nigeria. No annual report has been received from Nigeria for 2005 or 2010. Re-exports originating in Nigeria consisted of two live, wild-sourced birds traded for commercial purposes in 2004.

Tursha and Boyi (2011) stated that although the species was now very rare, there was still demand for live birds as well as body parts in many areas. Trade in *B. pavonina* was considered to be much more profitable than hunting birds for food, with a single live specimen selling for about EUR 150 on the local market (Tursha and Boyi, 2011). Some cranes were reportedly sold at high prices for export to the Middle East (Tursha and Boyi, 2011).

Management: *B. pavonina* was listed in the Second Schedule (Animals relation to which international trade may only be conducted under licence) of the Endangered species (control of international trade and traffic) Act of 1985, specifying that the hunting, capture, and trade

of the species required an official licence. Tursha and Boyi (2011) noted that as it was the national bird of Nigeria, its hunting and killing were taboo.

Elgood *et al.* (1994) stated that the Nigerian Government had adopted a conservation strategy addressing the threats to the species. According to Tréca (1996b), additional issues that needed addressing included the sustainable use of wetlands by local people and the ecological implications of large irrigation schemes in northern Nigeria. Tursha and Boyi (2011) called for efforts to combat trade in *B. pavonina* through effective monitoring of the borders between Nigeria, Chad and Cameroon by establishing stringent laws and prosecuting defaulters.

SENEGAL

Distribution in range State: The species was listed as breeding in the country (BirdLife International, 2011b). Populations were reported from the Lower Senegal River Basin (northwestern Senegal), the Casamance River (southwestern Senegal), and Upper Gambia River (southeastern Senegal) (Eljack, 1996; Williams *et al.*, 2003). Tréca (1996a) also reported the species from Niokolo-Koba National Park (southeastern Senegal).

Population trends and status: Estimates from 1985 and 1995 suggested population numbers of 1000 and 1000 – 2000 individuals (Urban, 1988; 1996). In surveys conducted in 2000 and 2001, Williams *et al.* (2003) estimated the total population to be more than 1900 individuals, with some populations seemingly increasing, including at the Casamance River one of the strongholds of the species, whereas other populations were declining or had unknown population trends. Beilfuss *et al.* (2007) estimated a population size of 1900 individuals in 2004. The overall population appeared to have stabilised during the last decades (Urban, 1988; 1996; Williams *et al.*, 2003).

Threats: Habitat loss was considered to be the main threat to the species in Senegal, including through drought, dam construction, expansion of rice cultivation, possibly chemical spraying against locusts, and the destruction of *Acacia nilotica* trees (Tréca, 1996a; Eljack, 1996).

Trade: According to data in the CITES Trade Database, trade originating in Senegal between 2000 and 2010 consisted of four live, wild-sourced birds exported by Senegal in 2005 for commercial purposes; this trade was not reported by the importer. With the exception of 2010, all annual reports have been received from Senegal.

Occasional capture and domestication has been reported (Eljack, 1996) although Tréca (1996a) stated that *B. pavonina* was not hunted or trapped for commercial trade.

Management: *B. pavonina* was listed as a fully protected species in decree No. 86-866 on hunting and wildlife protection. The hunting, capturing, and collecting of eggs was prohibited, however it was noted that permits for hunt on the species could be issued when population numbers were high within a certain area. The species occurs in at least one protected area (see distribution section above).

SIERRA LEONE

Distribution in range State: The species was listed as vagrant (BirdLife International, 2011b). Dowsett and Dowsett-Lemaire (1993) and Lepage (2011) considered the species to occur in Sierra Leone, although Williams *et al.* (2003) gave a population estimate of 'none?'. No recent records of resident populations were available.

Population trends and status: No population estimates were located. Meine and Archibald (1996) suspected that the population was extirpated.

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade from Sierra Leone was reported between 2000 and 2010. No annual reports have been submitted since 2005.

Management: *B. pavonina* was classified as a 'Prohibited animal' under the Second Schedule of the Wildlife Conservation Act No. 27 of 1972, making any hunting or capturing of the species illegal.

SUDAN AND SOUTH SUDAN

The Republic of South Sudan (hereafter referred to as South Sudan) formally seceded from Sudan on 9 July 2011. Most of the literature and data presented in this section were compiled before the two countries separated. Unless otherwise stated, the information presented in this review refers to Sudan prior to the declaration of independence of South Sudan.

Note that South Sudan is not a Party to CITES.

Distribution in range State: The species was listed as breeding in Sudan (BirdLife International, 2011b). The CITES Management Authority of Sudan (post-July 2011) (A. Al-Makki, *in litt.* to UNEP-WCMC, 2011) listed the following areas of occurrence: Dinder National Park, Radoum National Park, The Whilte Nile Islands between Ad Douiem and Kosti, permanent and temporary lakes in southern Kordofan State, seasonally flooded swamps in Western Kordofan State, and lakes and floodplains in the Southern and Western Dafur States.

Williams *et al.* (2003) listed several localities of occurrence: Tesi Swamp, Kelling Swamps, Radom National Park, Lake Kundi, Am-Dafogg (now southwestern Sudan), Lake Keilak (central Sudan, now southern Sudan), Dinder Flood Plain (now southeastern Sudan), and the Rift Valley (now South Sudan). Tréca (2009) reported a wide distribution of *B. pavonina*, especially south of latitude 12°N, and named major localities where large numbers of cranes were observed, including Lake Kundi and Randam National Park (now southwestern Sudan), Lake Abyed and Lake Keilack (now southern Sudan), and Dinder National Park (now southeastern Sudan). Hashim (2010) stated the Southern Dafur region (now southwestern Sudan) with Lake Kundi and Radom National Park was the key area for *B. pavonina* in Sudan, but it also occurred in Southern Kordofan (now southern Sudan) at Lake Keilak and Lake Abyad as well as in close proximity to the borders of South Sudan. Tirba (2000) indicated that it seemed to be abundant in the southern states of Sudan.

Population trends and status: Estimates from 1985 and 1995 suggested population numbers of 50 000 individuals (Urban, 1988; 1996). In surveys conducted in 2000 and 2001, Williams *et al.* (2003) estimated the total population to be more than 25 000 individuals. For all sites surveyed, the population was reported to be declining (Williams *et al.*, 2003). Beilfuss *et al.* (2007) estimated a population size of 25 000-52 000 individuals in 2004.

The CITES MA of Sudan (post-July 2011) (A. Al-Makki, *in litt.* to UNEP-WCMC, 2011) gave an estimate of around 26 000 individuals for Sudan; they also provided population estimates for nine sites in Sudan (Table 2).

Table 2. Estimates of *Balearica pavonina ceciliae* populations in Sudan 2010-2011. (Source: the CITES Management Authority of Sudan, A. Al-Makki, *in litt.* to UNEP-WCMC, 2011).

Location name*	Estimated population size
Southern Kordofan	2000
Western Kordofan	1000
Southern Darfur	14000
Western Dafur	1500
Radoum National Park	4000
Dinder National Park	500
White Nile islands south of Douiem	1000
Southern Gadarief State	1500
Southern west Kassala State	500
Total	**26000**

* All locations refer to sites in Sudan (post July 2011). No information was provided for sites in South Sudan.

Tréca (1996b) stated that the status of the species in Sudan could be described as common to very common in the areas where it occurred. Major concentrations of cranes could be seen in the southern part of the county, particularly in the Upper Nile State, where thousands flocked when moving between their feeding and roosting grounds (Tirba, 2000). Williams *et al.* (2003) noted that the species remained relatively common in southern Sudan, particularly south of a belt extending from Western Darfur State to the western parts of South Kordufan State. However, the authors noted that all populations appeared to be in decline across the country compared to the 1970s. Hashim (2010) claimed that the species had disappeared from Dinder National Park after the 1980s, and considered the species to be "critically endangered" in the country.

Threats: The CITES MA of Sudan (post-July 2011) (A. Al-Makki, *in litt.* to UNEP-WCMC, 2011) considered habitat loss (due to conversion and overexploitation of wetlands) and disturbance as the main threats to the species.

In general, local people were thought not to hunt *B. pavonina* for domestication or food (Al-Makki, *in litt.* to UNEP-WCMC, 2011), although Hashim (2010) reported that the bird was hunted for its meat by c. 30 per cent of the local people, and individuals of *B. pavonina* were reportedly captured for domestication by companies as well as governmental bodies. It was suggested that individuals captured by governmental authorities were most likely gifts for special guests of the State, while some companies were actively involved in exporting live specimens from the country (Hashim, 2010).

R. Beilfuss (*pers. comm.* to UNEP-WCMC, 2011) and K. Morrison (*in litt.* to UNEP-WCMC, 2011) considered that the capture of individuals for international trade was a particularly significant threat to the species in Sudan.

Trade: According to data in the CITES Trade Database, direct exports reported by Sudan between 2000 and 2010 comprised a total of 412 live, wild-sourced birds, of which the majority were traded for commercial purposes (Table 3). Importers also reported trade in 20 live, captive-bred birds for commercial purposes and twenty birds reported without a source specified; these imports were not confirmed by Sudan. Overall, direct exports of *B. pavonina* by Sudan peaked in 2004, but decreased subsequently. No re-exports originating in Sudan were reported over the period 2000-2010. Annual reports have not yet been received from Sudan for 2008-2010.

Table 3. Direct exports of *Balearica pavonina* from Sudan, 2000-2010. All trade was in live specimens. (No trade was reported in 2007).

Source	Purpose	Reported by	2000	2001	2002	2003	2004	2005	2006	2008	2009	2010	Total
C	T	Exporter											
		Importer					20						20
W	B	Exporter											
		Importer		15									15
	P	Exporter		4									4
		Importer									10		10
	T	Exporter		20	56	54	186	92					408
		Importer	50	20		50	185	20		10		30	365
-	T	Exporter											
		Importer			20								20

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

The CITES Management Authority of Sudan (A. Al-Makki, *in litt.* to UNEP-WCMC, 2011) reported that 141 birds were exported from Sudan over the period 2005-2011 (Table 4). The report highlights that no birds were exported in 2006 and 2007 due to avian influenza.

Table 4. Exports of live *Balearica pavonina* from Sudan, 2005-2011. (No trade reported 2006-2008).

2005	2009	2010	2011	Total
40	10	60	31	141

Source: CITES Management Authority of Sudan (A. Al-Makki, *in litt.* to UNEP-WCMC, 2011)

The International Crane Foundation (2009) reported that exports of wild caught *B. pavonina* had increased, and that around 600 individuals were officially exported between 2001 and 2005, but that due to imprecise population estimates, the impact on the wild population was unknown. K. Morrison (*in litt.* to UNEP-WCMC, 2011) reported that, according to "unsubstantiated reports", individuals of *B. pavonina* captured in Sudan were readily available on the international market. A study based on questionnaires and records from zoological gardens and entry ports of Sudan revealed that only 12 per cent of the exports for this species were traded with the necessary CITES permits (Hashim, 2010; K. Morrison, *in litt.* to UNEP-WCMC, 2011).

The CITES Management Authority of Sudan (post-July 2011) (A. Al-Makki, *in litt.* to UNEP-WCMC, 2011) considered that the volume of trade in the species was very small and that it did not threaten the species' survival, while Hashim (2010) stated the volume of trade in the species far exceeded the officially reported quantities and that the trade in Sudan was not controlled.

Management: In Sudan, the species was listed as protected under Schedule II of the Wildlife Protection Act of 1986 and its hunting or capture without a license was prohibited (The CITES Management Authority of Sudan, O. Sulieman, *pers. comm.* to UNEP-WCMC, 2011). No information on legislation was located for South Sudan.

The CITES Management Authority of Sudan (A. Al-Makki, *in litt.* to UNEP-WCMC, 2011) noted that no cranes were captured for trade 2006-2008 as a result of a ban imposed by the Animal Resources Ministry due to the avian influenza.

The species occurs in a number of protected areas (see distribution section above).

TOGO

Distribution in range State: The species was listed as breeding (BirdLife International, 2011b). The CITES Management Authority of Togo (T. Tengue, *pers. comm.* to UNEP-WCMC,

2011) reported that the species was found throughout the country. BirdLife International *et al.* (2011) recorded it from the north of Togo, including the Oti-Pendjari Basin.

Population trends and status: Estimates from 1985 and 1995 suggested population numbers of 50 individuals (Urban, 1988). Based on surveys in 2000 and 2001, the total population was estimated to be more than 110 individuals, with populations near the Oti River, Kéran National Park, and Oti-Mandouri valley considered to be declining (Williams *et al.*, 2003). Beilfuss *et al.* (2007) estimated the population size in 2004 at 50 individuals. Cheke and Walsh (1996) reported the occurrence of low numbers during the wet season, but increased numbers during the dry season due to regional migrations.

Threats: The main threats were reported to be the construction of dams, hunting, and high population density and growth (Cheke and Walsh, 1996).

Trade: According to data in the CITES Trade Database, no trade from Togo was reported 2000-2010. Annual reports have not been received for 2000, 2006, 2008, 2009 or 2010.

The CITES MA of Togo (T. Tengue, *pers. comm.* to UNEP-WCMC, 2011) reported that there was no considerable trade in the species from Togo.

Management: The Decree No 90-178 of hunting regulations specified the need for hunting permits and established a tax of XOF 5000 (~USD 10) for the hunting or capture of *B. pavonina*.

UGANDA

Distribution in range State: The species was listed as vagrant (BirdLife International, 2011b). Williams *et al.* (2003) reported a small population from Albert Nile (northwestern Uganda). Backhurst *et al.* (1980) stated that the species was a seasonal visitor from the north and was recorded at Pakwach and in Kabalega Falls National Park (northwestern Uganda).

Population trends and status: Estimates from 1985 and 1995 suggested population numbers of 500 individuals (Urban, 1988; 1996). Williams *et al.* (2003) estimated the total population to be less than 50 birds based on surveys conducted in 2000 and 2001. Beilfuss *et al.* (2007) estimated the population size at 50 individuals in 2004.

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade from Uganda was reported 2000-2010. With the exception of 2010, all annual reports have been received from Uganda.

Management: The Uganda Wildlife Statute No. 14 of 1996 specified the need of permits for hunting and trading protected species. According to the Game (Preservation and Control) Act of 1959 Cap. 226, Revision (1964), all cranes were included in First Schedule, Part A (animals not to be hunted or captured throughout Uganda except under special permit). The species occurs in at least one protected area (see distribution section above).

D. Problems identified that are not related to the implementation of Article IV, paragraphs 2 (a), 3 or 6 (a)

Illegal trade was reported to be a concern in Cameroon, Chad, Guinea, Mali, Nigeria and Sudan.

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Balearica regulorum (E.T.Bennett, 1834): Angola, Botswana, Burundi, Democratic Republic of the Congo, Kenya, Lesotho, Malawi, Mozambique, Rwanda, Uganda, United Republic of Tanzania, Zambia

Gruidae, Grey Crowned Crane.

Selection for Review of Significant Trade

At its 24th meeting, the Animals Committee included *Balearica regulorum* in the review of Significant Trade as an urgent case (AC24 Summary Record). At the 25th meeting of the Animals Committee, Namibia, Swaziland, South Africa and Zimbabwe were eliminated from the Review of Significant Trade based on responses provided (AC25 Summary Record).

A. Summary

Overview of *Balearica regulorum* recommendations.

Range State	Provisional category	Summary
Angola	Least Concern	Small population with trends unknown. Angola is not a Party to CITES but no international trade reported by importers 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Botswana	Least Concern	Small population and illegal trade reported to be a threat. However, no international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Burundi	Least Concern	Population of some hundreds, apparently rare. Trapping and egg collection reported to be a threat by one author. However, no international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Democratic Republic of the Congo	Least Concern	Relatively large population. Partially protected in the Democratic Republic of the Congo and no international trade reported since 2000. On the basis of no anticipated trade, categorised as Least Concern.
Kenya	Least Concern	Large population with declines reported. Protected in Kenya though anecdotal reports of capture for trade. No international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Lesotho	Least Concern	Vagrant, with no population estimates available. However, no international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Malawi	Least Concern	Very small population size with declines reported. However, fully protected in Malawi and no international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Mozambique	Least Concern	Small population. However, no international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.
Rwanda	Possible Concern	Small population apparently decreasing but current status not known. No international trade reported 2000-2010 although unreported and illegal trade reported, based on anecdotal information. The level and impact of apparent unreported trade is not known and given the unfavourable status of the species in Rwanda and the lack of information on the implementation of Article IV, categorised as Possible Concern.

Range State	Provisional category	Summary
Uganda	Possible Concern	Large population but severe declines reported. No international trade reported 2000-2010 although unreported and illegal trade reported, based on anecdotal information. The level and impact of apparent unreported international trade is not known and given the unfavourable status of the species in Uganda and the lack of information on the implementation of Article IV, categorised as Possible Concern.
United Republic of Tanzania	Possible Concern	Relatively large population but severe declines reported. No direct trade reported since 2005 according to data in the CITES trade database, however the Tanzian Management Authority reported the export of 182 birds 2006-2010. Unreported and illegal trade also reported, based on anecdotal information. Quotas for 100 birds have been set in recent years including 2011 with exports permitted for for zoos and scientific research. The level and impact of trade, including apparent unreported international trade is not known and given the unfavourable status of the species in Tanzania, categorised as Possible Concern.
Zambia	Least Concern	Relatively large populations but declines reported. However, protected in Zambia and no international trade reported 2000-2010. On the basis of no anticipated trade, categorised as Least Concern.

B. Species overview

Biology: *Balearica regulorum* (the Grey Crowned Crane) is an African waterbird that typically inhabits open areas near swamps and lakes (Mackworth-Praed and Grant, 1952). It commonly nests within or on the edges of wetlands, forages in wetlands and nearby grasslands (Meine and Archibald, (1996b) and roosts either in shallow water (Tréca, 1996) or in adjacent trees (Allan, 1996; Johnsgard, 1983; Walkinshaw, 1964). Although not a migratory species, local and seasonal movements in response to changing moisture levels and food availability were observed (Allan, 1996; Tréca, 1996).

B. regulorum was reported to feed on the tips of grasses, seeds, insects and other invertebrates, and small vertebrates (Johnsgard, 1983; Pomeroy, 1983). It is well-adapted to manmade habitats, and commonly found in a variety of agricultural land types (Meine and Archibald, 1996b; Muheebwa, 2007b; Smith, 2011; Tréca, 1996; van Niekerk, 2008).

The species is monogamous, forming pairs at the age of three years, and breeding once a year or every other year, for 16 years (Gichuki, 1996). Average clutch size is 2.5 eggs with an incubation period lasting 27-31 days and a fledging period generally between 56-120 days (Gichuki, 1996; Meine and Archibald, 1996b; Olupot *et al.*, 2009; Walkinshaw, 1964).

Taxonomic note: *B. regulorum* closely resembles the Black Crowned Crane (*B. pavonina*) (Dickinson, 2003). In the past, the two species were considered to form a single species (*B. pavonina*) (Johnsgard, 1983) but they have been considered separate species by both the current and former CITES Standard references for birds (Dickinson, 2003; Sibley and Monroe, 1990).

General distribution and status: *B. regulorum* occurs in eastern and southern Africa from eastern Democratic Republic of the Congo, Uganda, and Kenya to south-east South Africa (Walkinshaw, 1964). It was also recorded from Angola and Namibia along the Okavango River (Meine and Archibald, 1996b; Urban, 1983). The total extent of occurrence was estimated at 3 900 000 km² (Morrison *et al.*, 2007b).

The population trend was considered to be decreasing (BirdLife International, 2009; Meine and Archibald, 1996a). In 1985 the total population was estimated to be >100 000 individuals (Urban, 1996), and in 1995 it was estimated to be 85 000-95 000 (Meine and Archibald, 1996a; 1996b; Urban, 1996). In 2005, the population was reported to have declined to 50 000-64 000 individuals (Beilfuss *et al.,* 2007).

In 2009, *B. regulorum* was up-listed from Least Concern to Vulnerable in the IUCN Red List on the basis that habitat loss and the illegal removal of birds and eggs from the wild have driven rapid declines during the past three generations (BirdLife International, 2011a).

Threats: Principal threats to the species were considered to include the conversion and degradation of wetland breeding grounds, capture for trade and domestication (Beilfuss *et al.,* 2007; Meine and Archibald, 1996b; Morrison *et al.,* 2007b; Olupot *et al.*, 2009; Pomeroy, 1983), and poisoning (Howard, 2010; Smith, 2011).

B. regulorum was considered a highly valued ornamental bird on national and international markets (Beilfuss *et al.,* 2007), in high demand for private collections, breeding facilities, safari parks and zoos (K. Morrison, *in litt.* to UNEP-WCMC, 2011). Illegal trade was reported to be a major threat to the species (R. Beilfuss, *pers. comm.* to UNEP-WCMC, 2011; International Crane Foundation, 2011; K. Morrison, *in litt.* to UNEP-WCMC, 2011) and both legal and illegal trade were considered to be increasing (International Crane Foundation, 2009; Morrison, 2006). The short lifespan and poor breeding success of captive *B. regulorum* were considered to fuel the demand of specimens captured from the wild (International Crane Foundation, 2011).

Overview of trade and management: *B. regulorum* was listed in CITES Appendix II on 01/08/1975. According to data in the CITES Trade Database, international trade 2000-2010 primarily consisted of live birds exported mainly for commercial and zoological purposes. In total, exporters reported the direct export of 506 live birds over this period. Approximately two-thirds of this trade involved captive-bred specimens and most of the remainder was wild-sourced. In addition, small quantities of bodies, feathers, trophies, skulls, eggs and garments were also exported principally as personal possessions and for commercial purposes.

Beilfuss *et al.* (2007) noted that although several conservation programmes had been initiated to mitigate the threats to *B. regulorum* in Africa, the control of trade required action. Corruption, lack of resources, enforcement and awareness, and outdated and weak laws were seen to contribute to the illegal trade on African cranes (Morrison *et al.,* 2007a).

Meine and Archibald (1996b) reported *B. regulorum* was "legally (although not always effectively) protected in Kenya, Uganda, Zimbabwe, and South Africa (Johnson, 1992; Mafabi, 1991; Morris, 1987)." Often considered a sacred species, *B. regulorum* was reported to have a protected status in many local communities (Meine and Archibald, 1996b). K. Morrison (*in litt.* to UNEP-WCMC, 17/10/2011) noted that apart from Tanzania, which has implemented quotas for trade in the past, no other country seems to have implemented specific regulations for wild harvesting and trade.

C. Country reviews

ANGOLA

Distribution in range State: The species is restricted to southern Angola (BirdLife International, 2011; Mackworth-Praed and Grant, 1962; Sinclair and Hockey, 1996). Meine and Archibald (1996b) indicated two isolated populations in the southern part of the country, and Dean (2000) considered its distribution to be limited to "floodplains and

flooded grasslands in extreme southern Angola".

Population trends and status: *B. regulorum* was found "in small numbers" in Angola (BirdLife International, 2009) where it was not uncommon. The population size was estimated to be 100 individuals in 1985 and 1994 (Urban, 1996) and in 2004 (Beilfuss *et al.*, 2007).

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade from Angola was reported 2000-2010. Angola is not a Party to CITES and therefore has not submitted any annual reports.

Management: *B. regulorum* was not included in the list of protected species in Appendix I of the Decree No 40.040 (1955) on the Protection of Land, Flora and Fauna (Ministério do Ultramar, 1955). Cirelli and Morgera (2010) noted that a draft Forest, Wildlife and Protected Areas Law (2006) was under development, and that in this law, the list of protected species "should be determined on the basis of reports based on the best available scientific information, and subject to the approval of local communities, taking into account historic records of population levels and existing risks". They described the wildlife law enforcement in Angola as "limited" (Cirelli and Morgera, 2010).

BOTSWANA

Distribution in range State: The species has a limited distribution in the northern part of the country (Sinclair and Hockey, 1996) in the Makgadikgadi Pans (BirdLife Botswana, 2011; Meine and Archibald, 1996b).

Population trends and status: The estimated population size in 1985 and 1994 was 100 individuals (Urban, 1996); in 2004 a population size of less than 20 individuals was reported (Beilfuss *et al.*, 2007). More recently BirdLife Botswana (2011) commented that the exact population size was unknown but probably "low relative to available habitat".

BirdLife Botswana (2011) noted: "the species is not common in the Okavango – instead the Makgadikgadi wetlands, and especially the Nata Sanctuary, are its stronghold. It has been recorded breeding in the Sanctuary, and during 2007, the largest flock recorded in Botswana, 17 birds, was seen in the vicinity of the Nata River delta". The species was classified as a "Category B Rarity" bird (uncommon, however with more than ten recorded occurrences) and a bird of "Conservation Concern" in Botswana (BirdLife Botswana, 2008).

Threats: The main threats were considered to include illegal trade, habitat destruction and powerline collisions (BirdLife Botswana, 2011).

Trade: According to data in the CITES Trade Database, no trade from Botswana was reported 2000-2010. Annual reports have been received for all years except 2010.

Management: The Botswana Wildlife Conservation and National Parks Act (1992) listed *B. regulorum* as a Protected Game Animal under the Sixth Schedule, banning hunting or capture without permits, which may be granted for such purposes as education, scientific research, conservation or disease control (Government of Botswana, 1992). However, the Act allows the killing of animals which damage crops, unless in a national park or a game reserve (Government of Botswana, 1992). The Wildlife Conservation and National Parks Act also includes regulations on the implementation of CITES (Government of Botswana, 1992).

BURUNDI

Distribution in range State: The species' range extends across Burundi (BirdLife International, 2011; Meine and Archibald, 1996b). Schouteden (1966a) reported occurrences

in various localities by Lake Tanganyika in southwestern Burundi, Lake Rwihinda in northern Burundi, Ngozi in the central part of the country and Kamaniola in the west.

Population trends and status: The population was estimated to be 400-600 individuals in 1985 and some hundreds in 1994 (Urban, 1996) and in 2004 (Beilfuss *et al.,* 2007). The CITES Scientific Authority of Burundi (J. Rushemeza, *in litt.* to UNEP-WCMC, 2011) reported that no recent studies had been conducted on the status of the species, however it was considered very rare.

Threats: Habitat loss was regarded as the main threat to the species (J. Rushemeza, *in litt.* to UNEP-WCMC, 2011; USAID, 2010); additional threats included live trapping, the collection of eggs and hunting (USAID, 2010).

Trade: According to data in the CITES Trade Database, no trade from Burundi was reported 2000-2010. No annual reports have been received for 2009 or 2010.

Management: The Burundi regulations for Hunting and the Protection of Animals (1971) specified the need for valid hunting licences (Burundi, 1971). *B. regulorum* was not listed as a protected species in the country (Burundi, 1971).

DEMOCRATIC REPUBLIC OF THE CONGO

Distribution in range State: The species has a limited distribution in the eastern part of the country (Mackworth-Praed and Grant, 1962; Meine and Archibald, 1996b).

Population trends and status: The country is considered one of the strongholds for the species, the total population size was estimated at 5000 individuals (Beilfuss *et al.,* 2007; BirdLife International, 2009).

Threats: No information was located.

Trade: According to data in the CITES Trade Database, direct exports reported by the Democratic Republic of the Congo between 2000 and 2010 consisted of six live, wild-sourced birds traded for commercial purposes in 2000; this trade was not confirmed by the importer. With the exception of 2010, all annual reports to CITES have been received from the Democratic Republic of the Congo.

Management: *B. regulorum* was listed as a partially protected species in the country (Republique Democratique du Congo, 2006), and may be hunted with authorization (Journal Officiel de la République Démocratique du Congo, 2005). The Hunting Law of 1982 specified the need for various permits depending on the purpose of hunting (Journal Officiel de la Republique du Zaire, 1982).

B. regulorum was reported to occur in the Upemba National Park in the southeastern part of the country (Lepage, 2011).

KENYA

Distribution in range State: The species is found in the central and south-western parts of Kenya (BirdLife International, 2011; Meine and Archibald, 1996b), and is largely absent from the northern and eastern parts of the country (Kenya Birds, 2011). It was found in highland marshes up to 3000 m in altitude (Kenya Birds, 2011).

Population trends and status: Kenya may hold the largest remaining populations of *B. regulorum* (BirdLife International, 2009), in particular the Mwea Irrigation scheme in Central Kenya where the species seemed to have adapted well to feed on the irrigated rice fields (Musyimi *et al.,* 2008). However, anecdotal evidence suggests significant declines in the country (K. Morrison, *in litt.* to UNEP-WCMC, 2011).

In both 1985 and in 1994 the population size was estimated to be 35 000 individuals (Urban, 1996), but by 2004 had declined to 20 000-25 000 (Beilfuss *et al.,* 2007) or 17 000-20 000 individuals (BirdLife International, 2009).

Threats: Habitat loss and degradation were considered to be the main threats to the species in Kenya (Musyimi *et al.,* 2008). Capture for domestication and for the export trade was also reported to be a threat (Mafabi, 1991; Katondo, 1996; Mirande *et al.*, in press cited in Meine and Archibald, 1996b) with adult and juvenile cranes and eggs captured for trade and traditional uses (Musyimi, 2007).

However, K. Morrison (*in litt.* to UNEP-WCMC, 2011) noted that "Reports of trade have been received from Kenya, but it does not appear as significant as what has been reported out of Uganda and Tanzania". Illegal exports of the species from Kenya were reported by Baker (1996).

Trade: According to data in the CITES Trade Database, no trade from Kenya was reported 2000-2010. With the exception of 2003, all annual reports have been received for the period 2000-2010.

Management: The Wildlife (Conservation and Management) Act of 1976 (amended in 1989) listed *B. regulorum* as a protected animal in Kenya, along with all other birds that were not classified as game animals (Government of Kenya, 1976; 1989). The Wildlife Act also specified that permits/licenses were needed for the ownership of live animals and trophies and the export of live protected animals (Government of Kenya, 1976; 1989).

Wanjala (2008) reported that the Kipsaina Cranes and Wetlands Conservation Group had been working in the rehabilitation and conservation of wetlands in the Lake Victoria area in western Kenya since 1990. The group had developed community involvement and awareness, alternative income generating activities, ecotourism, organic farming practices, and research activities including the monitoring of crane populations (Wanjala, 2008).

LESOTHO

Distribution in range State: The species was considered vagrant in Lesotho (BirdLife International, 2009), occurring in the eastern and southern parts of the country (BirdLife International (2011). Barnes (2001) reported that the species had been recorded in the Sehlabathebe National Park in eastern Lesotho during the 1970s and 1980s; it had not been observed in the 1990s although suitable habitat was known to exist.

Population trends and status: No population estimates were available for Lesotho (Beilfuss *et al.,* 2007).

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade from Lesotho was reported 2000-2010. Lesotho became a Party to CITES in 2003. No annual reports have been received for 2008-2010.

Management: The Historical Monuments, Relics, Fauna and Flora Act of 1967 banned the hunting, collection and trade of protected animal species without an authorised permit (Parliament of Lesotho, 1967). The Act is implemented by the Proclamation of Historical Monuments, Relics, Fauna and Flora Act (1969), which lists all cranes, including their eggs and nests, as protected species (Lesotho Minister of Education, 1969).

MALAWI

Distribution in range State: The species occurs throughout Malawi (BirdLife International, 2011; Meine and Archibald, 1996b), in wetlands and floodplains in Vwaza Marsh Wildlife

Reserve in the northern region of Malawi, Kasungu National Park in western Malawi, and Mpatsanjoka floodplain in Salima and Rusa Marshes in Kasungu District in the central region of Malawi (W. Mgoola, *in litt.* to UNEP-WCMC 2011). However, it may no longer occur in Kasungu National Park, the Zomba plateau and Elephant and Ndindi marshes in Southern Malawi (Kaliba and Nhlane, 2003; L. Roxburgh, *pers. comm.* to UNEP-WCMC, 2011).

Population trends and status: Although information on actual population size was limited, there appeared to be a general continuing decline especially outside protected areas (W. Mgoola, *in litt.* to UNEP-WCMC, 2011). The estimated population size in 1985 was reported to be some hundreds of individuals, in 1994, it was estimated to be 50-100 individuals (Urban, 1996) and in 2004, the population was reported to have been reduced to less than 50 individuals (Beilfuss *et al.,* 2007).

The species was reported to have disappeared from some parts of its historic range (W. Mgoola, *in litt.* to UNEP-WCMC, 2011), with reports that it may survive on the Dwangwa sugar estate but there may be only one pair remaining (J. Wilson, *in litt.* to UNEP-WCMC, 2011) or that the species may be extirpated (L. Roxburgh, *pers. comm.* to UNEP-WCMC 2011).

Threats: The main threats are loss of wetland habitats, bushfires, subsistence hunting with traps and snares, and fires and siltation of water pools within protected areas (W. Mgoola, *in litt.* to UNEP-WCMC, 2011). Kaliba and Nhlane (2003) considered hunting for meat as the main reason for population decline in many areas.

Trade: According to data in the CITES Trade Database and confirmed by the CITES Management Authority of Malawi (C. Manda *pers. comm.* to UNEP-WCMC, 2011), no trade from Malawi was reported 2000-2010. Annual reports have not yet been received from Malawi for 2000, 2002 or 2010.

Management: *B. regulorum* is protected in Malawi according to the National Parks and Wildlife Amendment Act of 2004, and no hunting is allowed (W. Mgoola, *in litt.* to UNEP-WCMC, 2011). No permits are issued by the Management Authority for the export of the specimens of the species (W. Mgoola, *in litt.* to UNEP-WCMC 2011).

W. Mgoola (*in litt.* to UNEP-WCMC, 2011) reported that the species was found in the Vwaza Marsh Wildlife Reserve and in Kasungu National Park, where "small numbers are protected" and noted that national legislation is enforced in protected areas through regular patrols and monitoring counts of wetland waterfowl. Also reported from the Nyika National Park (Kaliba and Nhlane, 2003).

MOZAMBIQUE

Distribution in range State: The species occurs in central and north-western parts of Mozambique (BirdLife International, 2011), with a more restricted distribution in north-west Mozambique indicated by Meine and Archibald (1996b) and a much wider range, covering nearly the entire northern half of the country suggested by MacLean (1988).

Population trends and status: In 1985 and in 1994, the population size was estimated to be some hundreds or "low 1000s" (Urban, 1996), in 2004, it was estimated to be under 200 individuals (Beilfuss *et al.,* 2007), and in 2007, it was estimated to be 150-200 individuals, with 79 individuals counted in the Gorongosa National Park (Beilfuss, 2008).

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade from Mozambique was reported 2000-2010. All annual reports have been received from Mozambique.

Management: The Mozambique Forest and Wildlife Act (No. 10/1999) includes requirements for hunting permits (Government of Mozambique, 1999), but does not detail for which species hunting is permitted.

Parker (2001) reported that the species was found in "notable numbers" in the Maputo Special Nature Reserve and that it occurred regularly in the Gorongosa mountain and National Park.

RWANDA

Distribution in range State: The species occurs throughout the country (BirdLife International, 2011; Meine and Archibald, 1996b), including Kigali and Nyanza in central Rwanda, Astrida and Rubona in the south and Kisenyi in the north-west of the country (Schouteden, 1966b). The populations were reported to be "scattered in different wetlands" (C. Nsabagasani, *pers. comm.* to UNEP-WCMC, 2011).

Population trends and status: The status in Rwanda was considered to be unknown (Kanyamibwa, 1996; C. Nsabagasani, *pers. comm.* to UNEP-WCMC 2011) although it was thought to be decreasing, particularly in areas close to human settlements (Kanyamibwa, 1996). Its status in Rugezi Marsh Ramsar site was "currently stable" (Nsabagasani, 2010).

Beilfuss *et al.* (2007) estimated a population size of some hundreds in 2004. Nsabagasani (2010) recorded a total population of 108 individuals in the Rugezi Marsh Ramsar site in 2009; this was considered to be probably the largest population in the country (Nsabagasani, *pers. comm.* to UNEP-WCMC 2011).

Threats: Capture for domestication was considered a main threat to the species (C. Nsabagasani *pers. comm.* to UNEP-WCMC 2011; K. Morrison, *in litt.* to UNEP-WCMC 2011), however it was not known whether any of these individuals are exported (K. Morrison, *in litt.* to UNEP-WCMC, 2011). The main causes of the decline in the Rugezi population included hunting and egg collection (Nsabagasani, 2010). Kanyamibwa (1996) noted that agricultural conversion had contributed to the population decline.

Trade: According to data in the CITES Trade Database, no trade from Rwanda was reported 2000-2010. Annual reports have not been received from Rwanda for 2003, 2008, 2009 or 2010.

The trade from Rwanda was considered to be significant by R. Beilfuss (*pers. comm.* to UNEP-WCMC, 2011) and, based on anecdotal information, although largely illegal, a portion of it was recorded at border points, but CITES permits were rarely issued and the trade was usually not reported to CITES. The source of individuals held by households and hotels was unknown (C. Nsabagasani, *pers. comm.* to UNEP-WCMC, 2011).

Management: The Ministerial order no. 007/2008 listed *B. regulorum* as a protected species and banned all unauthorised hunting (Rwanda Journal Officiel, 2008). C. Nsabagasani (*pers. comm.* to UNEP-WCMC, 2011) stated that capture and export permits are authorised by the Rwanda Development Board/Tourism and Conservation Department.

The species was reported to occur in Rugezi Marsh, which was the only Ramsar site in the country, and thus the only wetland area where human activities were regulated (Nsabagasani, 2010).

UGANDA

Distribution in range State: The species occurs in central and southern Uganda (BirdLife International, 2011; Meine and Archibald, 1996b), although Mafabi (2011) described a wide distribution in the country. Based on a study in 2005-2006, Olupot *et al.* (2009) concluded that most breeding sites were located in south-west Uganda and in swamp areas along the

River Nile. Similarly, a habitat suitability modelling study showed that most of the suitable habitat was found in south-west Uganda (Stabach *et al.,* 2009).

Population trends and status: Uganda is home to a globally significant population of *B. regulorum* (BirdLife International, 2009), with approximately half of the remaining global birds found in the country (Howard, 2010).

Population declines of up to 70 or 80 per cent since the early 1970s were reported (National Biodiversity Data Bank in prep. cited in Taylor, 2011; K. Morrison, *in litt.* to UNEP-WCMC, 2011). The population was estimated to be 35 000 individuals in 1985 declining to possibly less than 30 000 in 1994 (Mafabi *pers. comm.* with Urban cited in Urban, 1996). In 2004, the population size was estimated to be 13 000-20 000 individuals (Beilfuss *et al.,* 2007).

In a 2005-2006 study, breeding pairs were recorded in 21 out of 224 sites visited, while sightings of the species were made in 22 per cent of the visited sites. However, these 21 breeding sites were considered to be "likely an underestimate" of the total breeding sites in the country (Olupot *et al.,* 2009).

In surveys conducted in the Mburo-Nakivali wetland area in western Uganda using timed species counts, less than five individuals of *B. regulorum* were recorded (Nalwanga-Wabwire *et al.,* 2009). In similar surveys conducted in the Lake Opeta and Lake Bisina Ramsar sites in Eastern Uganda, the species was recorded present (Nalwanga-Wabwire *et al.,* 2009). Decreases in flock sizes and the number of breeding pairs were reported by Muheebwa (2007b).

Threats: The conversion of land for agricultural purposes was considered to be a major threat (Muheebwa, 2007b; Olupot *et al.,* 2009) with the loss of breeding areas and poor breeding conditions causing population declines (Mafabi, 1991; Olupot *et al.,* 2009). The collection of eggs, hunting and live-trapping, as well as nest destruction were regarded as the most common direct threats to breeding birds (Olupot *et al.,* 2009).

Meine and Archibald (1996b) stated that "capture for domestication and for the export trade is most extensive in Kenya, Uganda, and Tanzania, and should be considered a serious threat (Mafabi, 1991; Katondo, 1996; Mirande *et al*., in press)." In studies conducted in 2007 in five districts along the Tanzanian border and the western shoreline of Lake Victoria, it was found that the majority of cranes (referring to all three species occurring in the area) were captured for traditional medicine. Cranes were also captured for domestication due to their symbolic value, and their meat was sold as chicken in some areas (African Crane Trade Project, 2007). Large numbers of cranes were being caught for illegal trade, commonly marketed through Tanzania due to poor control in the border, but sometimes also through the capital Kampala (Muheebwa, 2007a). The inappropriate handling, poor aeration and feeding, and overall stress were reported to commonly cause injuries or death during capture, transport and captivity (African Crane Trade Project, 2007).

The removal of cranes from the wild was considered to likely be unsustainable, with mitigation measures required to avoid extinction (Muheebwa, 2007a).

Trade: According to data in the CITES Trade Database, no trade from Uganda was reported 2000-2010. Annual reports have been received from Uganda for all years except 2010.

R. Beilfuss (Muheebwa, 2007a) considered the trade from Uganda to be particularly significant, noting that although it was largely illegal, a portion of it was recorded at border points, but CITES permits were rarely issued and the trade was usually not reported to CITES.

Management: The Uganda Wildlife Statute (1996) specified the need of permits for hunting

and trading protected species (Government of Uganda, 1996); however, a list of protected species was not located. According to Baker (1996), *B. regulorum* is under total protection. Olupot *et al.* (2009) found that, in 2005-2006, the knowledge of the value of the national bird species was good, but there was a general lack of awareness amongst local communities about the population status and trends, resulting in lack of motivation towards conservation efforts.

The conservation of breeding habitats, along with the strengthening of laws controlling the killing, capture and destruction of nests were seen as a priority for the conservation of *B. regulorum* in Uganda (Olupot *et al.,* 2009). The aims of the Ugandan crane and wetland project (African Crane Trade Project, 2007) included developing wetland conservation plans, increasing public awareness, developing alternative livelihoods and improving the national policies and conservation programmes. It was reported that several wetland management plans had been initiated by Nature Uganda to protect wetland areas from conversion to agricultural uses (Muheebwa, 2008).

Mafabi (1991) noted that "there are some cranes in Uganda's national parks and game reserves, but they number no more than 20 pairs (Pomeroy *pers. comm.*)". D. Pomeroy (pers. comm. in Olupot *et al.,* 2009) reported that the main populations occurred outside protected areas, and there were no viable populations left within the protected areas.

UNITED REPUBLIC OF TANZANIA

Distribution in range State: The species occurs mainly in western and northern parts of the country (Baker, 2007) and is absent from some parts of south-eastern Tanzania (BirdLife International, 2011; Meine and Archibald, 1996b). The CITES Management Authority of Tanzania (*in litt.* to UNEP-WCMC, 2011) reported the species to be widespread in National Parks and Game Reserves but uncommon in human settlements.

Population trends and status: The population of *B. regulorum* in Tanzania was reported to be decreasing (Morrison *et al.,* 2007b), with a potential decline of 75 per cent over 25 years (International Crane Foundation, 2011), despite the reported availability of suitable habitat (K. Morrison, *in litt.* to UNEP-WCMC, 2011).

In the 1980s, the total population in Tanzania was estimated to be a maximum 20 000 individuals (Baker, 2007). The population, in 1985 and 1994, was estimated to be several thousand individuals (Urban, 1996), and in 2004, "low 1000s" (Beilfuss *et al.,* 2007). Baker (2007) estimated the population size to be under 5000 individuals noting that the actual figure could be considerably lower than this. The CITES MA of Tanzania (*in litt.* to UNEP-WCMC, 2011) indicated that a national population estimate is not available.

Threats: The main threats in Tanzania were considered to include habitat loss due to agriculture and grazing, and the bird trade (Katondo, 1996; CITES MA of Tanzania *in litt.* to UNEP-WCMC, 2011); the species was also reported to be occasionally poisoned by farmers in response to crop damage (Katondo, 1996).

A rapid trade assessment conducted in north-western Tanzania in 2007 found evidence of capture and trade, however the findings also showed that the number of captured birds had decreased during the previous four years, and the price of cranes had increased (Morrison, 2007). Mortality rates during transport and capture were considered relatively low (Morrison, 2007). One study, conducted in partnership with Traffic East Southern Africa, found that *B. regulorum* was captured for trade purposes in the Malagarasi Muyovosi Ramsar site in north-west Tanzania (K. Morrison, *in litt.* to UNEP-WCMC, 2011). Morrison (*in litt.* to UNEP-WCMC, 2011) found a good awareness amongst local communities of the illegal nature of crane trade.

Trade: According to data in the CITES Trade Database, no direct trade from Tanzania has been reported since 2005. Exports reported by Tanzania between 2000 and 2005 comprised a total 162 live, wild-sourced birds traded for zoological purposes; importers reported the import of 152 live, wild-sourced birds over this period, primarily for commercial purposes (Table 1). With the exception of 2007, all annual reports have been received from Tanzania for the period 2000-2010.

Table 1. Direct exports of *Balearica regulorum* from Tanzania, 2000-2010. (No trade was reported 2006-2010).

Source	Term	Purpose	Reported by	2000	2001	2002	2003	2005	Total
C	live	Z	Exporter						
			Importer	26	20				46
W	live	B	Exporter						
			Importer	8	6				14
		T	Exporter						
			Importer	32	19	24	19	8	102
		Z	Exporter	108	31	17		6	162
			Importer	36					36
	skins	H	Exporter						
			Importer			2			2

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

In contrast to data in the CITES Trade Database, the CITES MA of Tanzania (*in litt.* to UNEP-WCMC, 2011) reported that a total of 182 *B. regulorum* had been exported 2006-2010.

Tanzania published export quotas for live *B. regulorum* in every year 2000-2004 and 2008-2011 (Table 2). Exports reported by Tanzania appear to have remained within these quotas, but according to importer-reported data the quotas in 2002 and 2003 were apparently exceeded.

Table 2. CITES export quotas for live, wild-sourced *Balearica regulorum* originating in Tanzania, and associated global trade in live, wild-sourced specimens as reported by Tanzania and the importing countries, 2000-2010. (Annual reports for 2007 have not yet been received from Tanzania; data for 2011 is not yet available.)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Quota	**366**	**50**	**20**	**6**	**5**				**100**	**100**	**100**	**100**	
Reported by Exporter	108	31	17			6						-	162
Reported by Importer	76	25	24	19		8						-	152

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Indirect trade in *B. regulorum* originating in Tanzania over the period 2000-2010 consisted principally of live, wild-sourced birds, with 46 re-exported, the majority for commercial purposes, with smaller numbers traded for zoos.

R. Beilfuss (*pers. comm.* to UNEP-WCMC 2011) considered the trade from Tanzania to be significant, noting that although it was largely illegal, a portion of it was recorded at border points, but CITES permits were rarely issued and the trade was usually not reported to CITES. According to anecdotal evidence, cranes may be transported by planes to the Middle East from northern Tanzania without passing through customs or border checks (K. Morrison, *pers. comm.* to UNEP-WCMC 2011). It was also noted that "cranes can be bought in Tanzania through 'special arrangements' with Wildlife Division officers, despite them not being included on the quota system" (K. Morrison, *pers. comm.* to UNEP-WCMC 2011).

Management: The Wildlife Conservation Act of 2009 set the need for hunting licences and permits for the capture of any animal (United Republic of Tanzania, 2009). *B. regulorum* was not listed as a national game species under particular protection (United Republic of Tanzania, 2009). However, the CITES MA of Tanzania (*in litt.* to UNEP-WCMC, 2011) considered the export quota of 100 specimens per year not to be detrimental to the species' survival, given that no offtake is allowed in protected areas, the species' availability at capture sites indicates a healthy wild population, and export is only permitted under exceptional circumstances (i.e. zoos and scientific research).

A resident population was reported to probably occur in the Ugalla Game Reserve in central-western Tanzania, although it was noted that the species was not "particularly abundant" in the Reserve (Beckner, 2008).

ZAMBIA

Distribution in range State: The species has a wide distribution in Zambia except in the north-west tip of the country (Benson *et al.,* 1971; BirdLife International, 2011; Meine and Archibald, 1996b). In the North-Western Province there are no records outside of the Kafue National Park and it was reported to be scarce in the Northern Province, though common in the Kafue Basin and the Luangwa Valley (Benson *et al.,* 1971). However, Dodman (1996a) reported occurrence in the plains between the Mweru Wantipa and Tanganyika lakes in the Northern Province.

The CITES Scientific Authority of Zambia (E. Phiri *in litt.* to UNEP-WCMC 2011) reported that it was a breeding resident in all Ramsar Sites and other wetland areas in Zambia, particularly the Busanga Plains in Kafue National Park, Bangweulu Flats, Kafue Flats, Liuwa Plains and South Luangwa National Park. Within the Kafue Flats area, the species mainly occurred within the Lochinvar and Blue Lagoon National Parks (Dodman, 1996b).

Population trends and status: In 1985, the population size was estimated to be several thousands of individuals; in 1994, it was estimated to be 5000-6000 (Urban, 1996). It decreased to less than 3000 in 2004 (Beilfuss *et al.,* 2007). The CITES SA of Zambia (E. Phiri *in litt.* to UNEP-WCMC 2011) noted that according to surveys, the species had disappeared from some areas of its historical range. Katanekwa (1996) reported that the range of the populations in the Barotse Floodplains and associated floodplain areas had diminished over the previous two decades, with only a small population of 80 birds left in the Liuwa Plains area.

Flocks of 150-200 individuals were reported to occur on the Kafue Flats, the Busanga and Liuwa Plains, and groups of 500 birds had been observed outside breeding season in the Luangwa Valley (Dowsett, 2009 cited in E. Phiri, *in litt.* to UNEP-WCMC). The size of the nesting population in the Kafue Flats area was estimated to be 200-300 individuals (Dodman, 1996b). L. Roxburgh (*pers. comm.* to UNEP-WCMC 2011) considered the species abundant in South Luangwa.

Threats: The main threats were considered to be habitat loss and degradation (E. Phiri *in litt.* to UNEP-WCMC 2011; Katanekwa, 1996) and heavy use of pesticides (Meine and Archibald, 1996b). Further major threats included human disturbance caused by fishing, egg collecting and nest raiding; and mammal and duck hunting activities (Kampamba and Pope, 1996). Katanekwa (1996) considered hunting as a main cause of population decline, besides habitat loss, in the Barotse Floodplains.

Trade: According to data in the CITES Trade Database, no trade from Zambia was reported 2000-2010. With the exception of 2000, all annual reports have been received for the period 2000 to 2010.

The CITES SA of Zambia (E. Phiri *in litt.* to UNEP-WCMC 2011) confirmed that there had been no international trade from Zambia or domestic trade within the country in over 10 years. He also noted that "There have been no cases of illegal trade in Grey Crowned Crane recorded by the Zambia Wildlife Authority. Incidents of illegal domestic trade are not well documented in Zambia but these include collection of eggs/chicks by local residents for food."

Management: The National Parks and Wildlife (Protected Animals) Order of 1993 lists *B. regulorum* as a protected species, along with all other crane species (Laws of Zambia, 2006). The CITES SA of Zambia (E. Phiri *in litt.* to UNEP-WCMC 2011) stated that hunting, killing or capturing the species without an appropriate licence was illegal. They also reported that the Zambia Wildlife Authority (ZAWA) was involved in 1) controlling poaching through its anti-poaching/law enforcement unit, 2) controlling illegal exports, particularly at international airports, and 3) encouraging the private sector to undertake efforts in captive breeding of the species. However, ZAWA had not yet developed management and harvesting guidelines to facilitate sustainable utilisation of the species in the near future (E. Phiri *in litt.* to UNEP-WCMC 2011).

One author commented that the centralization of the wildlife regulations from local authorities to the central government in 1969 had led to increased exploitation of bird species in the country (Katanekwa, 1996).

Breeding populations were reportedly found in all Zambian Ramsar sites (including all major wetlands in Zambia), including the Kafue and South Luangwa National Parks (E. Phiri *in litt.* to UNEP-WCMC 2011). It was also reported to occur in Lochinvar and Blue Lagoon National Parks within Kafue Flats (Dodman, 1996b).

D. Problems identified that are not related to the implementation of Article IV, paragraphs 2 (a), 3 or 6 (a)

Illegal trade was reported to be a problem in Botswana, Kenya, Rwanda, Uganda and Tanzania.

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Mantella aurantiaca Mocquard, 1900: Madagascar

Mantellidae, Golden Frog.

Selection for Review of Significant Trade

The genus *Mantella* was first selected for review at the 21st meeting of the Animals Committee on the basis of trade data provided in document AC21 Doc. 10.2. *Mantella aurantiaca* was eliminated from this review at the 23rd meeting of the Animals Committee on the basis that trade was 'of least concern' (AC23 Doc. 8.4). However, at its 24th meeting, the Committee expressed concern that a quota of 2500 specimens had been established for 2009, noting that the species had been listed as Critically Endangered by the IUCN (AC25 Doc. 9.3). Following a review of information provided by Madagascar regarding the basis for the established quota, the Committee agreed to re-instate *M. aurantiaca* into the Review of Significant Trade on 1st March 2011 (AC25 Doc. 9.3).

A. Summary

Provisional category	Summary
Least Concern	Classified as Critically Endangered. Highly localised distribution within the Moramanga District in eastern Madagascar. Based on surveys undertaken 2004-2007, the total population was estimated at between 4275 and 11 457 individuals. Principal threat is habitat destruction due to mining, conversion to agriculture and deforestation. Collection for commercial trade requires authorisation from the relevant government authority and a quota system has been implemented based on population studies. Trade was suspended by Madagascar between 2004 and 2008, but export quotas were published in 2009, 2010 and 2011. Reported trade in 2009 was within the quota, with some trade from the 2009 quota actually exported in 2010. A five-year Species Conservation Strategy for *M. aurantiaca* was launched by the Madagascar government in 2010, including habitat conservation measures and ensuring that exploitation of the species is sustainable. Management and conservation measures have been put in place by Madagascar, a system of quotas is implemented, and available information suggests that the provisions of Article IV of CITES are being met, therefore categorised as Least Concern.

B. Species overview

Biology: *Mantella aurantiaca* is a small, diurnal poisonous frog (Glaw and Vences, 2007) endemic to eastern Madagascar (Randrianavelona *et al.,* 2010a). It is distinguished by its unique uniform red-orange or yellow-orange dorsal colouration (Glaw and Vences, 2007). Adults range in size from 19-24 mm, with females occasionally reaching 31 mm (Glaw and Vences, 2007).

M. aurantiaca occurs exclusively in primary and secondary humid rainforest generally dominated by screw pine (*Pandanus*) (Vences and Raxworthy, 2008) between 873 and 1054 m above sea level (Randrianavelona *et al.,* 2010a). The species is terrestrial and lays its eggs in moist leaf litter on the ground, with one clutch comprising between 20 and 60 eggs. Following a 14-day embryogenesis, the larvae are flushed by rain into small pools where they metamorphose within approximately 70 days. Sexual maturation occurs within a year, and generation time is short (Glaw and Vences, 1994). Woodhead *et al*. (2007) reported that the species is a generalist, feeding on mites, ants, flies and collembolans.

Taxonomic note: Up until just over a decade ago, species in the genus *Mantella* were distinguished largely subjectively on the basis of phenotypic variation, with different authors recognizing different numbers of species (Schaefer *et al.,* 2002). *M. aurantiaca* is phenotypically and genetically distinct (e.g. Vences *et al.,* 1999; Schaefer *et al.,* 2002), although *M. milotympanum* is closely related to *M. aurantiaca* and was not described as a distinct species until 1996 (Randrianavelona *et al.,* 2010b). Vences and Raxworthy (2008) reported that "The taxonomy of this group is uncertain but the definition of *Mantella aurantiaca* is clear and there seems to be little genetic subdivision within the species".

C. Country review

MADAGASCAR

Distribution in range State: *Mantella aurantiaca* is known to occur only in the humid forests within the Moramanga District in eastern Madagascar (Randrianavelona *et al.,* 2010a), where its distribution is highly localised in three distinct clusters of sites (Figure 1). Surveys by Bora *et al.* (2008) and Randrianavelona *et al.* (2010a) reported one cluster of 21 sites in the Andranomena-Mangabe forest in the municipalities of Ambohibary, Beparasy and Vodiriana to the south-west of Moramanga. Another cluster of sites was recorded in the Torotorofotsy wetlands in the municipality of Andasibe (five sites) and the surrounding forests in Analamay and Ambatovy in the municipality of Ambohibary (13 sites) to the north-east of Moramanga (Bora *et al.,* 2008; Randrianavelona *et al.,* 2010a). Bora *et al.* (2008) also recorded the species at two sites to the north-west of Moramanga in the Ambakoana region in the municipality of Amboasary. These data indicate a total extent of occurrence of 1189 km^2 and an area of occupancy of 112 km^2, or 626 km^2 and 89 km^2, respectively, if the outlying populations are not considered (Randrianavelona *et al.,* 2010b). The discovery of one population in the municipality of Vodiriana to the west of the Mangoro river, previously thought to be a barrier to dispersal (Randrianavelona, 2009), opens the possibility that the species may be present in new areas as yet unexplored by herpetologists (Randrianavelona *et al.,* 2010b).

The historical distribution of the species was much wider than its current distribution (Figure 1, Randrianavelona *et al.,* 2010b). There have been various unconfirmed reports of the species occurring in localities outside the three regions described above (e.g. Behra *et al.,* 1995). Several of these records are thought to have been the result of confusion of *M. aurantiaca* with the related species *M. milotympanum* (Vences *et al.,* 1999). Other records remain uncertain, including sites in Maromizaha, Ambavaniasy and the forest of Vohidrazana (Behra *et al.,* 1995), all of which were surveyed by Vieites *et al.* (2009) without success; and a site near Ankaratra, Ambatolampy (Behra *et al.,* 1995), considered unlikely due to its altitude of over 1300m and the absence of humid forest (Randrianavelona *et al.,* 2010b).

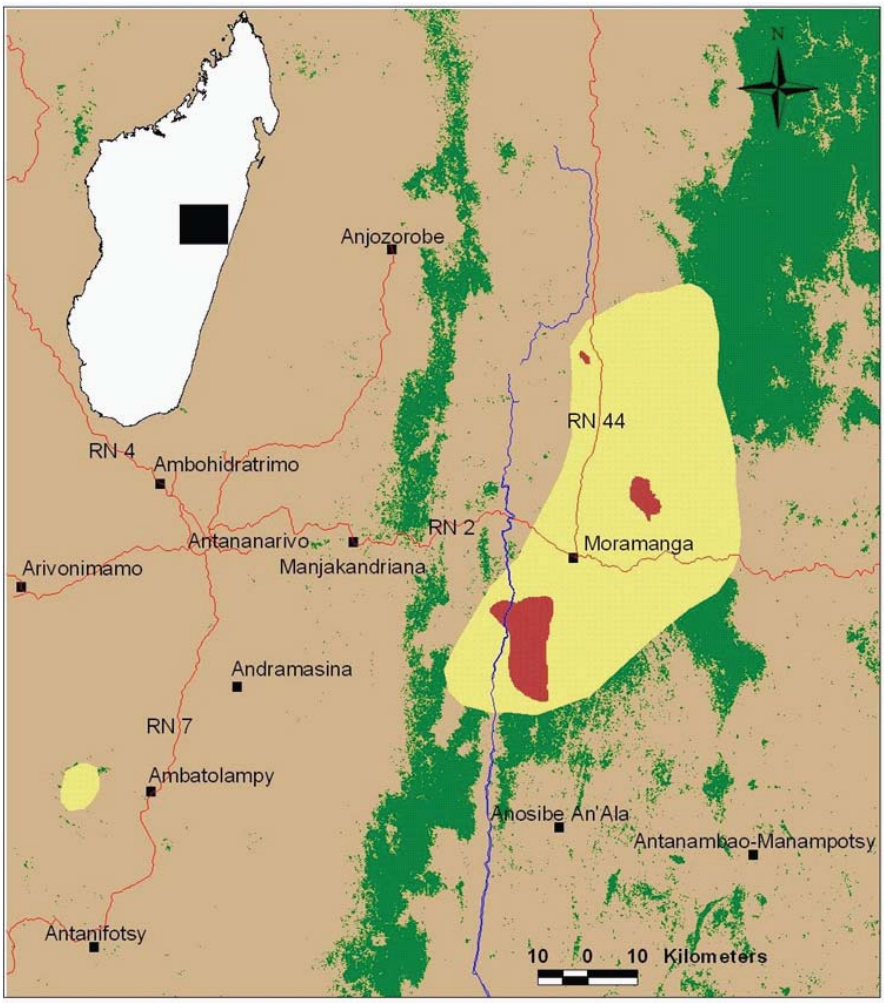

Figure 1. Historical (yellow) and current (red) distribution of *Mantella aurantiaca*.
(Source: Randrianavelona *et al*. 2010b)

Population trends and status: Between 2004 and 2007, Rabemananjara (2008a) conducted rapid population size and density assessments using mark-recapture methods at two sites in Torotorofotsy and one site in Andranomandry (south-west of Moramanga). Population estimates in each site ranged from 75 to 201 individuals (Rabemananjara *et al.,* 2008a). Based on these figures and the number of available ponds, the total population size of the species was estimated at between 4275 and 11 457 individuals (CITES Management Authority of Madagascar *in litt.* to UNEP-WCMC, 2011). Estimated densities ranged from 836 individuals/ha to 1317 individuals/ha (Rabemananjara *et al.,* 2008a), although the authors stress that the density estimates should not be extrapolated to larger areas, since the assessments were undertaken in sites where aggregations of individuals were known to occur, and since most of the surveys were conducted in the breeding season when adults are particularly aggregated (Rabemananjara *et al.*, 2008a).

Between 2007 and 2008, Randrianavelona *et al*. (2010a) surveyed 33 localities in the Moramanga District that had been previously reported to contain breeding populations of *M. aurantiaca*, and recorded individuals in 26 of these localities. A total of 471 individuals were found of which 49 per cent were female, 45 per cent were male and the remainder juvenile. Fewer than 10 individuals were found in 60 per cent of sites, while population numbers over 50 were recorded at only five sites (Randrianavelona *et al*., 2010a).

Of a total of 59 pond localities found to be inhabited by *M. aurantiaca* between 1990 and 2011, 54 are thought to remain suitable habitat for *M. aurantiaca* in 2011 (CITES MA of

Madagascar *in litt*. to UNEP-WCMC, 2011).

In a previous study, Vences *et al*. (2004) interviewed local collectors of *M. aurantiaca* in Andranomena (Andranomena-Mangabe forest) and reported that the number of specimens collected "ranged from 50 00 to 20 000 individuals collected yearly (from Andranomena) for the past 5-10 years", and noted that all populations visited (one in Andranomena and two in Torotorofotsy) appeared to be healthy. The same study found a high mitochondrial diversity in the populations sampled, indicating a moderate to high effective population size in past generations with no evidence for bottleneck effects resulting from over-collecting (Vences *et al*., 2004).

M. aurantiaca was categorised as Critically Endangered in the IUCN Red List on the basis that "its Area of Occupancy is probably less than 10 km^2, its distribution is severely fragmented, and the extent of its forest habitat in east-central Madagascar is declining, and the number of mature individuals might also be declining through over-exploitation" (Vences and Raxworthy, 2008).

In addition to the wild populations of *M. aurantiaca*, a total captive population of around 700 individuals in 51 different institutions has also been recorded, primarily in North America and Europe (Randrianavelona *et al*., 2010b).

Threats: The principal threats facing *M. aurantiaca* include collection of the species for the international pet trade, and habitat destruction and degradation through activities associated with mining, conversion to agriculture and commercial logging (Randrianavelona *et al*., 2010a). In particular, mining and deforestation activity affects the ponds used by *M. aurantiaca* by increasing sedimentation and turbidity (Randrianavelona *et al*., 2010b), while nearby agricultural activity can influence the water table (Randrianavelona *et al*., 2010a). According to the CITES MA of Madagascar (*in litt* to UNEP-WCMC, 2011), collection from the wild is now less of a threat, but the population is still in decline because of habitat loss from mining and agriculture.

Three localities in Mangabe inhabited by *M. aurantiaca* are within zones where controlled exploitation of the forest is planned in future; a further five localities overlap with the Ambatovy mining area or its associated pipeline (Randrianavelona *et al*., 2010a). Randrianavelona *et al*. (2010a) noted that *M. aurantiaca* "can withstand a certain degree of disturbance to the forest surrounding (the) ponds if the integrity of the water body is maintained." Three ponds were reportedly destroyed by illegal miners in Mangabe between November 2010 and February 2011 (Jenkins and Randrianavelona, 2011).

M. aurantiaca is in particularly high demand for the pet trade due to its distinctive bright colouration and ease of keeping and breeding in captivity (Andreone *et al*., 2006; Rabemananjara *et al*., 2008b). However there is some evidence, primarily anecdotal, that even intensive collecting has not had a noticeable effect on local population densities (Vences *et al*., 2004; Andreone *et al*., 2005; Rabemananjara *et al*., 2008a; Rabemananjara *et al*., 2008b).

Fires may also pose a threat to *M. aurantiaca* habitat (Randrianavelona *et al*., 2010a; Vences *et al*., 2004).

Climate change poses a potential threat to *M. aurantiaca.* The restricted altitudinal range of *M. aurantiaca* and its highly fragmented distribution renders the species particularly vulnerable (Randrianavelona *et al*., 2010b).

Trade: *M. aurantiaca* was listed in CITES Appendix II on 16/02/1995. The species was first exported commercially in the late 1980s or early 1990s, with a few thousand specimens reportedly exported per year (Jenkins and Rakotomanampison, 1994).

According to data in the CITES Trade Database, trade in wild-sourced *M. aurantiaca* reported by Madagascar 2000-2010 consisted of 29 549 live animals principally exported for commercial purposes (Table 1). Importers reported smaller quantities, perhaps because Madagascar reported on the basis of permits issued rather than actual trade; this was the case in 2000 and 2001 annual reports, but in subsequent reports the basis of reporting was not specified. Annual reports have been received from Madagascar for all years.

Table 1. Direct exports of wild-sourced *Mantella aurantiaca* from Madagascar, 2000-2010. (No trade was reported 2007 or 2008.)

Term	Purpose	Reported by	2000	2001	2002	2003	2004	2005	2006	2009	2010	Total
live	T	Exporter	11445	10305	4780					610	2329	29469
		Importer	5676	7245	1450	2681				90	1290	18432
	P	Exporter	60	20								80
		Importer										
specimens	S	Exporter						20	50			70
		Importer					105	50	50			205
bodies	S	Exporter	17	5			105	1	5			133
		Importer						1	5			6

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Trade of an additional 300 live, ranched specimens for commercial purposes was reported by importers in 2001.

Madagascar published export quotas for live, wild-sourced *M. aurantiaca* in 2001; quotas were reported to be "in preparation" in 2002 and 2004 but were not published (Table 2). Madagascar adopted a quota suspension between 2004 and 2008 following the establishment of the Scientific Authority (AC25 Doc. 9.3), with the result that no live exports were reported in this period. Export quotas for live, wild-sourced specimens were subsequently published in 2009, 2010 and 2011.

Trade in 2010 appears to have exceeded the quota of 550 individuals, however, the CITES Management Authority (Rabesihanaka pers comm. to UNEP-WCMC, 2011) explained that, of the 2329 specimens exported in 2010, 1873 specimens were from the 2009 quota with the remainder from the 2010 quota. CITES Resolution Conf. 14.7 (Rev. CoP15) states that "A Party may decide exceptionally to authorize export in one year of specimens that were obtained in a previous year, and under the quota for that previous year. In such cases, the quota for the current year should not be increased in order to include the specimens obtained in the previous year. Rather the number or quantity of such specimens that will be exported should be deducted from the quota of the previous year."

Table 2. CITES export quotas for live, wild-sourced *Mantella aurantiaca* originating in Madagascar, and associated global trade in live, wild-sourced specimens, 2000-2010. (No quotas or trade data were reported 2005-2008).

	2000	2001	2002	2003	2004	2009	2010	2011
Quota		8000	*		*	2500	550	550
Reported by Exporter	11505	10325	4780			610	2329	
Reported by Importer	5676	7245	1450	2681		90	1290	

*Quotas were reported to be "in preparation" (www.cites.org)

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Between 2000 and 2005, indirect trade originating in Madagascar consisted principally of

live, wild-sourced animals traded for commercial purposes, with none reported since 2005.

Rabemananjara *et al.* (2008b) estimated that up to 100 per cent more *Mantella* individuals are collected from the wild than are actually exported due to its relatively high mortality both during transport and in the farms and facilities of some exporters.

Illegal trade is not thought to take place on a large scale due to the relatively low commercial value of the species and their fragility in transport (Rabemananjara *et al.,* 2008b). Between 2003 and 2004, collectors were paid 400-500 FMG per specimen, while intermediaries were paid 1000-1500 FMG; these values are average relative to other species in the genus, with collector prices ranging between 250 and 2000 FMG and intermediary prices between 700 and 6000 FMG (Rabemananjara *et al.,* 2008b). No seizures or confiscations have been recorded within the CITES Trade Database since 1997. A survey of amphibians and reptiles for sale in Thailand during 2010 found no specimens of *M. aurantiaca* (Todd, 2011); seizures of 60 specimens in the UK and an undisclosed quantity of specimens in Taiwan, Province of China, were reported in 1997 and 1998, respectively, while Malagasy customs authorities seized seven specimens at Ivato airport in May 2011 (CITES MA of Madagascar *in litt*. to UNEP-WCMC, 2011).

Management: *M. aurantiaca* is protected under national legislation as a Category 1, Class II species (Decree No. 2006-400 of 13th June 2006), and as such can only be collected from the wild with the authorisation of the Ministère de l'Environnement, des Eaux et Forêts (MinEnvEF) and subject to quotas established by CITES (Rakotoarivelo *et al.,* 2011). Wildlife trade in Madagascar is regulated by MinEnvEF through its Direction Générale (DGEEF); exporters must obtain a collecting permit from the DGEEF, renewable every three years, which certifies that the housing and storage facilities for the live specimens are adequate (Rabemananjara *et al.,* 2008b). A permit is also required from the DGEEF for the export of each individual shipment, which is issued after consultation with the CITES Scientific Authority of Madagascar (Rabemananjara *et al.,* 2008b). The CITES Management Authority divides the export quota amongst the exporters based on the cleanliness, spaciousness, management and capacity of their premises; an extra 10 per cent of the quota is allocated to account for mortality (CITES MA of Madagascar *in litt.* to UNEP-WCMC, 2011). According to Rabemananjara *et al*. (2008b), the DGEEF, the Scientific Authority and airport customs together constitute a robust framework for the regulation and control of wildlife trade in Madagascar.

Madagascar adopted a quota suspension in 2004 following the establishment of the Scientific Authority (AC25 Doc. 9.3). The quota of 2500 live specimens published in 2009 was calculated taking into consideration population densities calculated by Rabemananjara *et al*. (2008a) which, compared to densities estimated in the same areas over a decade previously (Behra *et al.,* 1995), indicated that "the harvest ban has already had the desired effect on population densities" (AC25 Doc. 9.3). However, Rabemananjara *et al*. (2008a) stated that "these partly very high population densities in our and previous studies refer to specimens gathering in very small areas…and therefore can by no means be extrapolated to the whole distribution areas of these species". The quotas established in 2010 and 2011 were lower than in 2009 (550 live specimens in each year). The 2010 and 2011 quotas were calculated using the same formula as the quotas in 2009, but population density was substituted for population size (CITES MA of Madagascar *in litt.* to UNEP-WCMC, 2011). The calculation used the average of the population size estimates obtained by Rabemananjara *et al*. (2008a), and assumed that collection would take place across seven different ponds (CITES MA of Madagascar *in litt.* to UNEP-WCMC, 2011). The CITES MA of Madagascar "consider this quota to be non-detrimental to the species" in view of the fact that collection is only permitted in certain breeding ponds, and "there are unlikely

to be any mis-identification issues in any link of the commodity chain" (CITES MA of Madagascar *in litt.* to UNEP-WCMC, 2011).

In February 2011, the Malagasy government launched a five-year Species Conservation Strategy for *M. aurantiaca* (Randrianavelona *et al.,* 2010b). The Strategy was produced by Madagasikara Voakajy, a Malagasy NGO, and the Amphibian Specialist Group, and is intended to guide conservation action directed at the species by all parties over the next five years (Randrianavelona *et al.,* 2010b). The principal goals of the *M. aurantiaca* Species Conservation Strategy include conserving and restoring terrestrial and aquatic habitats; preserving the scientific, economic, social and cultural value of the sites in which the species occurs, including the maintenance of essential ecosystem services; ensuring that exploitation of the species is sustainable and the economic benefits are equitably shared with local communities; and promoting the collaboration of all stakeholders to ensure effective management (Randrianavelona *et al.,* 2010b). Specific actions related to regulating harvest and trade of the species include introducing community-based participative monitoring schemes at collection sites; estimating the size and density of all known populations, identifying the most suitable sites and periods for harvest and monitoring the effects of harvesting; conducting an annual evaluation of the species' status in order to inform the Malagasy CITES Authorities; developing a system of traceability of collected specimens to combat illegal trade; and investigating the feasibility of a captive-breeding and re-introduction programme (Randrianavelona *et al.,* 2010b). Several of the key actions included in the Strategy are already being implemented with support from various donors (Jenkins and Randrianavelona, 2011). A participatory workshop is planned (subject to funding) for the end of 2012 or early 2013 to evaluate progress towards implementing each action point in the Strategy (R. Jenkins, pers comm. to UNEP-WCMC, 2011a).

According to the CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2011), all but 9 per cent of the sites known to be occupied by *M. aurantiaca* are under some form of "current, or nominal, management that is of benefit to frogs and their habitat". The northern part of the Mangabe forest, including nine localities inhabited by *M. aurantiaca*, was awarded provisional protected area status by the Malagasy government in October 2008 (Randrianavelona *et al.,* 2010a) and its status will remain provisional until the end of 2012; a public consultation process is currently underway (R. Jenkins pers. com. to UNEP-WCMC, 2011b) The presence of *M. aurantiaca* was a key factor in the designation of this reserve (Randrianavelona *et al.,* 2010b). One population in the Torotorofotsy wetlands occurs within the new Zahamena-Ankeniheny Corridor protected area, which is also in the course of obtaining its formal protected status (Randrianavelona *et al.,* 2010b). Both of these provisional protected areas are IUCN category VI sites and include zones of sustainable exploitation of natural resources (Randrianavelona *et al.,* 2010b). Three localities inhabited by *M. aurantiaca* are included within the Torotorofotsy Ramsar site, where community-based projects are underway to protect and sustainably use biodiversity (Randrianavelona *et al.,* 2010b).

The southern part of the Mangabe forest, in Koloala, is currently under a system of sustainable forest management (Randrianavelona *et al.,* 2010b). Regular patrols by armed police in Mangabe have reportedly led to a reduction in illegal mining in the region, but are unlikely to eradicate the problem since mining is sufficiently lucrative to be worth the risk to those involved (Jenkins and Randrianavelona, 2011). There are plans to involve local community groups in Mangabe in monitoring the harvest of *M. aurantiaca* and conserving the breeding ponds, while some breeding ponds in the area are under strict protection (CITES MA of Madagascar *in litt.* to UNEP-WCMC, 2011). A *Mantella* Management Plan is being produced for those populations overlapping the Ambatovy mine footprint

(Randrianavelona *et al.,* 2010a; Jenkins and Randrianavelona, 2011), but future mining activity is expected to negatively impact 30 per cent of the ponds known to be inhabited by *M. aurantiaca* (CITES MA of Madagascar *in litt.* to UNEP-WCMC, 2011). A biodiversity offset programme is planned by the mine, which will involve improving the conservation status of *M. aurantiaca* populations at other sites in Mangabe and Torotorofotsy (CITES MA of Madagascar *in litt.* to UNEP-WCMC, 2011).

D. Problems identified that are not related to the implementation of Article IV, paragraphs 2 (a), 3 or 6 (a)

Mantella aurantiaca may be confused with *M. crocea* and particularly *M. milotympanum* (Vences *et al.,* 1999; Rabemananjara *et al*., 2008b); *M. aurantiaca* and *M. milotympanum* were reported to be confused in trade until 2002 (AC25 Doc. 9.3). However, an identification guide for the species most commonly in trade has been produced to resolve this problem (CITES Management and Scientific Authorities of Madagascar, 2006, cited in AC24 Doc. 7.3).

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Huso huso (Linnaeus, 1758): Azerbaijan, Bulgaria, Georgia, Hungary, Islamic Republic of Iran, Kazakhstan, Russian Federation, Turkmenistan

Acipenseridae, Beluga, Great Sturgeon.

Selection for Review of Significant Trade

Huso huso was previously included in the CITES Review of Significant Trade 2001-2006 (actions summarised in SC54 Doc. 30.1). The species was discussed again at the 23rd meeting of the Animals Committee, when it was recommended that the Secretariat and the range States provide a document at AC24, with detailed scientific information on which to base a decision (AC23 Summary Record). A questionnaire was subsequently sent to the range States of *H. huso* requesting a response by 31 October 2008. At AC24, *H. huso* was selected for inclusion in the Review of Significant Trade process (AC24 Summary Record). At AC25, the working group decided to retain Bulgaria, Georgia, Hungary, the Islamic Republic of Iran (hereafter referred to as Iran), Kazakhstan, the Russian Federation and Turkmenistan in the Review of Significant Trade. It was agreed to eliminate Azerbaijan subject to written confirmation to the Secretariat of the zero quota being in place within three weeks (AC25 Summary Record).

A. Summary

Overview of *Huso huso* recommendations.

*Provisional categories of Least Concern were formed on the basis of prohibition of harvest and no anticipated trade. The recommendations are based on the assumption that prohibition will continue and be enforced for the foreseeable future. For all countries under review, it is envisaged that trade would be permitted only in the event that substantial new information on the status of species was available; in the absence of such information, any trade would be considered to be Urgent Concern.

Range State	Provisional category	Summary
Azerbaijan	Least Concern*	Populations have declined considerably due to overfishing. Moderate levels of international trade in wild-sourced caviar reported by Azerbaijan 2000-2008, and by importers up to 2009. A moratorium on commercial fishing was established in 2009, as confirmed by the CITES MA of Azerbaijan and reflected in the trade data available. On the basis of a prohibition of harvest and no anticipated international trade, the requirements of Article IV are not applicable, and therefore categorised as Least Concern. However, it is envisaged that trade in wild specimens would resume only in the event that substantial new information on the status of species was available; in the absence of such information, any trade would be considered Urgent Concern.

Range State	Provisional category	Summary
Bulgaria	Least Concern*	Status poorly known but Danube stocks reported to have declined severely. Moderate levels of international trade in wild-sourced caviar reported 2000-2006 and trade in captive-bred caviar reported 2004-2011. Bulgaria implemented a total ban on sturgeon fishing in the Black Sea in 2006, 2007 and 2011, which was extended to the Danube in 2011; this was confirmed by the CITES authorities of Bulgaria and reflected in the trade data available. On the basis of prohibition of harvest and no anticipated international trade, categorised as Least Concern. However, it is envisaged that trade in wild specimens would resume only in the event that substantial new information on the status of species was available; in the absence of such information, any trade would be considered to be Urgent Concern.
Georgia	Least Concern*	Small population with declines reported. Harvest permitted only for scientific purposes. No international trade reported from Georgia 2000-2010. On the basis of prohibition of harvest and no anticipated international trade, categorised as Least Concern.
Hungary	Least Concern*	Possibly extinct, though restocking programmes have begun. Natural spawning prevented by dams between Hungary and the Black Sea. Catch of the species prohibited since 1988. No international trade in wild-sourced specimens from Hungary reported 2000-2010. On the basis of prohibition of harvest, no anticipated international trade and probable extinction of the species, categorised as Least Concern.
Islamic Republic of Iran	Possible Concern*	Population declines reported. Extensive restocking programme has been in place for nearly two decades, though the country has limited capacity for natural spawning, particularly due to dam construction on important rivers. Tightly regulated and reported to be well managed. Relatively high levels of international trade in wild-sourced caviar reported 2000-2010; trade in meat also reported. Although sturgeon fishing reported to be prohibited in 2011, this has not been confirmed to the CITES Secretariat and, given that trade was reported in 2010, it is not clear whether or not the provisions of Article IV are being implemented therefore categorised as Possible Concern. Furthermore, it is envisaged that trade would be permitted only in the event that substantial new information on the status of species was available; in the absence of such information, any trade would be considered to be Urgent Concern.
Kazakhstan	Possible Concern*	Natural spawning sites remain intact in the Ural River. However, catches have declined and harvest rates were considered unsustainable. Relatively high levels of international trade in wild-sourced caviar reported 2000-2009; trade in meat also reported. Although sturgeon fishing reported to be prohibited since 2010, this has not been confirmed by the CITES authorities of Kazakhstan. Given that trade has been reported recently (2009), it is not clear whether or not the provisions of Article IV are being implemented therefore categorised as Possible Concern. Furthermore, it is envisaged that trade would be permitted only in the event that substantial new information on the status of species was available; in the absence of such information, any trade would be considered to be Urgent Concern.

Range State	Provisional category	Summary
Russian Federation	Possible Concern*	The Volga River was reported to contain the most important population, however access to spawning sites disrupted by dam construction and "drastic declines" observed. Populations in the Sea of Azov consist entirely of hatchery-raised fish. Extensive restocking in place since the 1950s. No international trade in wild-sourced caviar or meat reported by the Russian Federation since 2002, however, low level trade reported by importers until 2007. Commercial harvest was reported to have been prohibited, however, this has not been confirmed to the CITES Secretariat and, given that export quotas were published in 2008 and 2010, it is not clear whether or not the provisions of Article IV are being implemented therefore categorised as Possible Concern. Furthermore, it is envisaged that trade would be permitted only in the event that substantial new information on the status of species was available; in the absence of such information, any trade would be considered to be Urgent Concern.
Turkmenistan	Least Concern*	Species a vagrant in the country with stocks decreasing. Threatened by excessive pollution and poaching. No international trade from Turkmenistan reported 2000-2010. Turkmenistan (a non-Party) has previously had a quota allowance from Kazakh waters. Given the prohibition of harvest in the Russian Federation and Kazakhstan, zero export quotas for Turkmenistan 2007-2011, on the basis of no anticipated trade, categorised as Least Concern.

B. Species overview

Biology: *Huso huso* is the largest species of sturgeon, with some adults reaching 100 years of age and more than 1000 kg in weight (Billard and Lecointre, 2001; Carocci, 2004). It is a migratory anadromous species, spending most of its live in large brackish waterbodies of the Caspian and Black Seas, swimming upstream to freshwater rivers to spawn (Billard and Lecointre, 2001; Kottelat and Freyhof, 2007).

The age at which sexual maturity is reached has been reported variably. For males, sexual maturity occurs between 9-16 years (Billard and Lecointre, 2001; Ciolac and Patriche, 2005; Mola *et al.,* 2011; Vecsei *et al.,* 2002) and for females between 14-22 years (Billard and Lecointre, 2001; Ciolac and Patriche, 2005; Mola *et al.,* 2011; Vecsei *et al.,* 2002). Spawning intervals were reported to be every 3-4 years for males and 5-6 years for females (Billard and Lecointre, 2001).

The location of spawning sites depends on conditions such as bottom substrate and velocity of the current, rather than distance from the river mouth (Bloesch *et al.,* 2005). Spawning was reported to peak in late winter to spring and again in late summer to autumn (Kottelat and Freyhof, 2007). Fish migrating in the spring spawned within a few weeks of entering natal rivers (Vecsei *et al.,* 2002; Kottelat and Freyhof, 2007).

General distribution and status: *Huso huso* was historically widespread, inhabiting the Black, Azov, Caspian and Adriatic Seas (Vecsei *et al.,* 2002; Kottelat and Freyhof, 2007; Kottelat *et al.,* 2009). However, the range of migration has been reduced by dam construction in all major rivers, impacting approximately 90 per cent of spawning grounds (Barannikova *et al.,* 1995; Caspian Environment Programme, 2002).

Most Black Sea populations are suspected to be nearly extirpated due to overfishing and impoundment of spawning rivers (Vecsei *et al.,* 2002; Kottelat and Freyhof, 2007;

Kottelat *et al.*, 2009). The last wild population in the Black Sea was reported to migrate up the Danube River (Kottelat *et al.*, 2009), where it was still reproducing in the lower Danube (Vecsei *et al.*, 2002; Kottelat and Freyhof, 2007); however, stocks were feared to be under threat of collapse due to overharvest (Bloesch *et al.*, 2005).

The species is believed to be extinct in the Adriatic Sea, while populations in the Sea of Azov are believed to consist entirely of hatchery-raised fish (Birstein *et al.*, 1997; TRAFFIC International *et al.*, 2000; Billard and Lecointre, 2001; Graham and Murphy, 2007; Kottelat *et al.*, 2009). In the Caspian Basin, both the number of spawning individuals and catches of *H. huso* have declined dramatically (Khodorevskaya *et al.*, 1997; 2007; Ivanov *et al.*, 1999; Pikitch *et al.*, 2005; Ludwig, 2008), with more than 90 per cent of the Caspian Sea stock reported to originate from hatcheries (Kottelat *et al.*, 2009). The last wild population in the Caspian Basin was reported to migrate up the Ural River, with the Volga population dependent on restocking (Kottelat and Freyhof, 2007, Kottelat *et al.*, 2009).

H. huso was categorised as Critically Endangered in the IUCN Red List, due to the estimated decline in the wild native population of over 90 per cent over the past three generations, due to overfishing and loss of spawning sites due to dams (Kottelat *et al*., 2009). It was reported that "overfishing for meat and caviar will soon cause global extinction of the remaining natural wild populations", with survival in the immediate future dependent on stocking and fisheries management as well as combating illegal fishing (Kottelat *et al*., 2009).

While populations of all Eurasian sturgeons have declined, the situation was reported to be most critical for *H. huso* (Ludwig, 2008). The total abundance estimates decreased from 21.3 million individuals in the late 1980s to 8.9 million individuals in 1994 (Pal'gui, 1992; Khodorevskaya *et al.*, 2000a; 2000b; 2000c; 2000d; 2001a; 2001b) to 11.6 million individuals in 2002 (Khodorevskaya *et al.*, 2009).

Pikitch *et al.* (2005) cautioned that although the abundance estimates calculated by range States in compliance with CITES suggest large population sizes and increasing abundance, "alternative calculations indicate dangerously small populations of beluga and harvest quotas equivalent to removal of nearly all mature individuals (Pikitch and Lauck unpublished data, cited in Ginsberg, 2002)."

H. huso was reported to be threatened by overfishing, poaching, loss of spawning habitats due to dam construction, and pollution (Billard and Lecointre, 2001; Vecsei *et al.*, 2002; Carocci, 2004; Graham and Murphy, 2007; Khodorevskaya *et al.*, 2009; Kottelat *et al*., 2009). Life-history characteristics, such as late maturation, were thought to make the species particularly sensitive to overfishing (Graham and Murphy, 2007).

Overview of trade and management in the species: *Huso huso* was listed in CITES Appendix II on 01/04/1998. Trade from selected range States 2000-2010 consisted principally of caviar and meat, with small quantities of live animals, skins, swim bladders, live eggs, specimens and bodies also traded. The vast majority of trade was wild-sourced and for commercial purposes. The main range States involved in trade were Iran and Kazakhstan, with smaller quantities originating in the Russian Federation, Bulgaria, Azerbaijan, Hungary and Serbia and Montenegro.

Resolution Conf. 12.7 (Rev. CoP14) on *Conservation of and trade in sturgeons and paddlefish* requires that range States establish export quotas for caviar and meat of Acipenseriformes from shared stocks (starting from 1 March and ending on the last day of February the following year), derived from catch quotas based on an appropriate regional conservation strategy and monitoring regime, that is not detrimental to the survival of the species' in the wild. In 2011, no export quotas for wild-sourced sturgeon products were communicated to

the Secretariat; therefore, in line with Resolution Conf. 12.7 (Rev. CoP14), zero export quotas were published for all wild-sourced sturgeon products.

Resolution Conf. 12.7 (Rev. CoP14) also requires that range States license legal exporters of specimens of sturgeon and paddlefish species and maintain a register of such persons or companies and provide a copy of this register to the Secretariat; Parties supply to UNEP-WCMC directly or to the Secretariat copies of all export permits and re-export certificates issued to authorize trade in caviar, no longer than one month after they have been issued, for inclusion in the UNEP-WCMC Caviar Database; and Parties implement the universal labelling system for caviar outlined in Annexes 1 and 2 and importing Parties not accept shipments of caviar unless they comply with these provisions.

Caviar made from the unfertilised eggs of *H. huso* is the most expensive of all caviars (Vogue, 2002, cited in Carocci, 2004). Internet searches conducted in October 2011 for *H. huso* caviar available in 1 kg quantities, found examples of prices ranging from AED 9000/kg (c. EUR 1800) for "Farmed Beluga Caviar", through GBP 3200/kg (c. EUR 3700) for "Farmed Sustainable" caviar to "Special Reserve" at EUR 12 200/kg.

Poaching and illegal trade of sturgeon species were considered to have increased following the dissolution of the Soviet Union (Khodorevskaya *et al.,* 1997; TRAFFIC International *et al.* 2000; Carocci, 2004; Pikitch *et al.,* 2005; Pourkazemi, 2006). At an international workshop to combat illegal trade in caviar held in 2006, illegal trade in sturgeon products was noted to be a "serious and growing concern" (Knapp *et al.,* 2006).

While there are a large number of measures in every Caspian country aimed at reducing illegal harvest, distribution and consumption, harvest through illegal uncontrolled and unreported fishing in the Caspian Sea is still considered to "substantially exceeded" legal harvest (Sharov, 2011). At the 25th meeting of the Animals Committee, the Secretariat reported having received relatively little intelligence relating to the illegal trade in caviar (in comparison with previous years), which may be due to the increasing difficulty for poachers in finding significant numbers of gravid females, as well as the demand for caviar increasingly being supplied by extensive aquaculture operations, which are spreading throughout many parts of the world (AC25 Doc. 16.1).

At the 25th meeting of the Animals Committee (July 2011, Geneva), it was noted that progress had not been made in improving the status of sturgeons, with ongoing decline in Caspian Sea stocks of particular concern, and illegal, unreported and unregulated (IUU) fishing and illegal domestic and international trade in sturgeon products being serious problems (AC25 Summary Record).

There have been three Regional CITES Meetings of the Black Sea and Azov Sea, during which a "Regional Strategy for the Conservation and Sustainable Management of Sturgeon Populations of the N-W Black Sea and Lower Danube River in accordance with CITES" has been agreed, and an Agreement between Fisheries and CITES Management Authorities from Bulgaria, Romania, Serbia and Montenegro and the Ukraine, concerning the implementation of the Regional Strategy, has been signed (Suciu, 2008).

The Commission on Aquatic Bio-resources of the Caspian Sea was formed in 1992 (with the membership of the Russian Federation, Azerbaijan, Kazakhstan, Turkmenistan and in 2001, Iran) to monitor and manage shared stocks of sturgeon and other Caspian Sea species (CABCS, 2003; Pourkazemi, 2006). The Commission was reported to have approved the methods for total allowable catch (TAC) allocation of aquatic resources, including sturgeon species, to Caspian range States, based on their contribution to the reproduction and conservation of bioresources (Khodorevskaya *et al.,* 2006, cited in Sharov, 2011). In February

2011, delegations of all five Caspian countries discussed a plan for a five year moratorium on harvest of all sturgeon species in the Caspian Sea (Sharov, 2011). The agenda of the 32nd session of the Commission, to be held in December 2011 was reported to include the issue of a moratorium on catching all species of sturgeon (R. Hajiyev *in litt.* to UNEP-WCMC, 2011).

In 2006, the Caspian countries adopted the 'Interstate Programme on the study of the distribution, abundance, stocks assessment, food supply and TAC determination of Caspian Sea sturgeons in 2007-2009' (Anonymous, 2006, cited in Sharov, 2011). According to the Programme, the Caspian-wide trawl survey was defined as the principal method of sturgeon stock assessment, with a total of 450 fixed stations sampled across the Caspian Sea during summertime (Sharov, 2011). All former Soviet Union member countries employ a fixed transect trawl survey, while Iran has adopted a stratified random survey design, following FAO's recommendation (Sharov, 2011).

Sturgeon stock assessment and total allowable catch (TAC) methodologies were reviewed for the Caspian range States at the 25th meeting of the CITES Animals Committee (AC24 Doc. 12.2; AC25 Doc. 16.2). The Committee concurred that current stock assessment methods were inadequate and agreed that insufficient sturgeon stock assessment expertise in the region and appropriate institutional structure to support such activities were major impediments to progress (AC25 Summary Record and a number of recommendations were made (AC25 WG4 Doc. 1; AC25 Summary Record; IISD, 2011).

The immediate future of *H. huso* appears to be dependent upon restocking (Kottelat and Freyhof, 2007). However, the use of aquaculture and hatcheries to support wild populations of sturgeons has been subject to criticisms, including: the emphasis of hatchery output over fisheries management and reducing fishing mortality (Doukakis *et al.*, 2010); difficulties in genetic management and lack of wild stock (Abdolhay, 2004; Doukakis *et al.*, 2010); hatchery-reared specimens lacking homing fidelity (which is needed to find the natal river and also to arrive at the spawning site at the correct time) (Lagutov and Lagutov, 2008); issues with interactions between hatchery-reared fish and native populations (including genetic erosion, behavioural changes and the introduction of disease) (Abdolhay, 2004); low survival rates of fingerlings from some hatcheries (Lagutov and Lagutov, 2008); and the opportunity to launder illegally-obtained caviar in aquaculture operations (Sellar, 2006).

C. Country reviews

AZERBAIJAN

Distribution in range State: The coastal waters of Azerbaijan were reported to be important winter feeding grounds for *H. huso* (CITES Management Authority of Azerbaijan, cited in TRAFFIC International *et al.*, 2000). It was reported that sturgeons no longer used the Kura River and may be almost extinct (Khodorevskaya, 1997; Levin, 1997).

Population trends and status: The CITES MA of Azerbaijan expressed concern over the status of *H. huso* stocks in the country noting poor natural reproduction and a lack of spawners to contribute to the country's sturgeon hatcheries (R. Hajiyev *in litt.* to UNEP-WCMC, 2011). They reported a reduction in the quantity, average population mass and population replenishment, along with changes in the qualitative structure of the population (R. Hajiyev *in litt.* to UNEP-WCMC, 2011).

A "considerable decline" in sturgeons throughout the region was attributed to overfishing, especially the selective catch of large spawning females and of smaller individuals with less commercial value within the quotas of hatcheries (WWF, 2010). Annual research trawl catches found two specimens in 2005, one in 2006 and no more until 2011, when one

specimen was found. Due to this low catch rate, Azerbaijan initiated net catches from coastal monitoring stations, which caught a total of 37 individuals during the period 2005-2008 (Table 1) (R. Hajiyev *in litt.* to UNEP-WCMC, 2011). Trawl surveys were conducted on 11 sections along the shelf of the Middle and South Caspian in August 2011. No *Huso huso* were recorded during 20 trawls in the Middle Caspian. In the South Caspian, during 35 trawls one specimen of *Huso huso* was encountered, weighing 1.32 kg and measuring 61 cm in length (MENR, 2011). Checks of net catches were also undertaken, with one *H. huso* encountered.

Evaluations of quantity and biomass of *H. huso* suggested an average of 0.19 million specimens in the Azerbaijan sector of the Caspian Sea since 2009 (Table 2) (R. Hajiyev *in litt.* to UNEP-WCMC, 2011). Based on 2011 surveys the total Kura River stock of *H. huso* in the Caspian Sea was estimated to be 140 000 fish, with an estimated field stock of 580 tonnes and overall stock of 4800 tonnes.

Table 1. Volume of monitoring catches of *Huso huso* from Azerbaijan coastal monitoring stations 2005-2008 (R. Hajiyev *in litt.* to UNEP-WCMC, 2011).

Year	*Huso huso* catches (specimens)	
	South Caspian Sea	Middle Caspian Sea
2005	5	2
2006	3	6
2007	4	8
2008	3	6

Table 2. Quantity and biomass of *Huso huso* in the Azerbaijan sector of the Caspian Sea 2009-2011 (R. Hajiyev *in litt.* to UNEP-WCMC, 2011).

Index	2009	2010	2011
Quantity (million specimens)	0.22	0.22	0.14
Biomass of overall stock (thousand tons)	6.8	6.8	4.8
Biomass of field stock (thousand tons)	0.82	0.82	0.58

Threats: The CITES MA of Azerbaijan considered the main reasons for species' decline to be: overfishing since the 1980s; man-made impacts; disruption of the reproductive cycle; industrial pollution; poaching; and the commercial demand for caviar (R. Hajiyev *in litt.* to UNEP-WCMC, 2011). The Vavarin reservoir on the Kura River was reported to prevent *H. huso* from accessing spawning grounds. Capture as by-catch also threatened the species (TRAFFIC International *et al.,* 2000).

The CITES MA of Azerbaijan noted the absence of cohesive fishing rules and a mechanism to conserve Caspian Sea stocks since the collapse of the Soviet Union and highlighted the need to preserve the *H. huso* gene pool (R. Hajiyev *in litt.* to UNEP-WCMC, 2011).

Trade: According to data in the CITES Trade Database, exports reported by Azerbaijan 2000-2010 consisted primarily of wild-sourced caviar, totalling 2297.1 kg (Table 3). The majority of wild-sourced caviar was traded for commercial purposes, with a relatively small quantity (56 kg as reported by Azerbaijan) traded as personal possessions. Trade in caviar increased to a peak in 2005 but decreased in subsequent years. Azerbaijan has not yet submitted an annual report to CITES for 2008, 2009 or 2010.

In addition to exports of caviar, Azerbaijan reported the export of meat in 2003 and 2004, all for commercial purposes.

According to data held in the Caviar Database, a total of 960.1 kg of wild-sourced *H. huso* caviar was exported by Azerbaijan over the period 2005-2011 (Table 4). According to the CITES MA of Azerbaijan, over the ten years up to 2009, trade in *H. huso* amounted to 0.2-0.3

tonnes of caviar and 2.5-3.0 tonnes of meat per year (R. Hajiyev *in litt.* to UNEP-WCMC, 2011). Quantities of *H. huso* in illegal trade were unknown (R. Hajiyev *in litt.* to UNEP-WCMC, 2011).

Table 3. Direct trade in *Huso huso* from Azerbaijan, excluding trade for scientific purposes, 2000-2010. (Quantities rounded to the nearest tenth of a kg, where applicable. No trade was reported in 2010.)

Source	Term	Reported by	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
W	caviar (kg)	Exporter	145.8	146.8	332.4	561.9	291.5	372.8		300.0	*146.0		2297.1
		Importer		238.1	268.9	368.6	206.1	489.4		290.6	154.6	141.39	2157.7
	meat (kg)	Exporter				99.5	666.0						765.5
		Importer											
I	caviar (kg)	Exporter											
		Importer	1.4	0.6	21.9	1.5		1.5	1.1	0.6	1.3	1.7	31.5

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK
*Based on permit details submitted for the Caviar Database.

Table 4. Direct trade in *Huso huso* caviar reported by Azerbaijan in the Caviar Database, 2005-2011. All trade was wild-sourced and for commercial purposes. (No permits were received in 2006, 2010 or 2011.)

Term (unit)	2005	2007	2008	2009	Total
caviar (kg)	372.8	300.0	146.0	141.4	960.1

Source: Caviar Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Azerbaijan published export quotas for wild-sourced *H. huso* caviar and meat in most years 2000-2010 (Tables 5 & 6). Caviar quotas appear to have been exceeded in 2003, 2004 and 2005. For trade reported in 2009, all permits were issued before 29 February (i.e. during the 2008 quota year), and no trade in caviar was recorded during the 2009 quota year. In 2009, a copy of a permit issued for 200 kg meat was submitted to UNEP-WCMC for entry in the Caviar Database; if this trade occurred, it would have exceeded the zero export quota in place for meat.

Re-exports of *H. huso* originating in Azerbaijan 2000-2010 primarily consisted of wild-sourced caviar traded for commercial purposes.

Table 5. CITES export quotas for wild-sourced *Huso huso* caviar originating in Azerbaijan and associated global trade, 2000-2011 (quantities rounded to the nearest tenth of a kg, where applicable).

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Quota* (kg)	700[1]	520	530	400	250	250	-	300	300	0#	0	0#
Reported by Exporter (kg)	145.8	146.8	332.4	561.9	291.5	372.8		300.0	146.0[2]			
Reported by Importer (kg)		238.1	268.9	368.6	206.1	489.4		290.6	154.6	141.39		

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK
* From 2008 onwards the quota year runs from 1st March to 28th February of the following year, whilst trade is reported by calendar year
# No export quota communicated to the Secretariat
[1] Quota was published for caviar originating in Azerbaijan that was re-exported via the Russian Federation.
[2] Based on permit details submitted for the Caviar Database

Table 6. CITES export quotas for wild-sourced *Huso huso* meat originating in Azerbaijan and associated global trade, 2003-2011 (quantities rounded to the nearest tenth of a kg, where applicable).

	2003	2004	2005	2006	2007	2008	2009	2010	2011
Quota* (kg)	2800	-	2880[1]	-	-	3000	0#	0	0#
Reported by Exporter (kg)	99.5	666							
Reported by Importer (kg)									

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

* From 2008 onwards the quota year runs from 1st March to 28th February of the following year, whilst trade is reported by calendar year

No export quota communicated to the Secretariat

[1] Applies to meat and products

Management: Azerbaijan established a moratorium on commercial fishing for *H. huso* in 2009, with a reservation for a quota for scientific research and reproduction (Anonymous, 2010, cited in Sharov, 2011; the CITES MA of Azerbaijan, R. Hajiyev *in litt*. to UNEP-WCMC, 2011). Previously, sturgeon fishing regulations in Azerbaijan included requirement of a license (since 2000), no fishing in the open sea, a closed season in May and a minimum size limit of 165 cm in the Kura River and 180 cm in coastal waters (Raymakers, 2002a).

Mamedli (2006), representing the CITES MA of Azerbaijan, reported that Azerbaijan had adopted a number of laws to regulate and control illegal trade, including illegal sturgeon fishing. These included the Law of the Republic of Azerbaijan on fishing, Fishing Regulations, and Regulations governing sales and use of sturgeon. Export of caviar was reported to be restricted to a single customs crossing point, namely Baku airport (Mamedli, 2006). The Bioresources Guard Service, in close contact with the competent agencies of the Azerbaijan Ministry of Internal Affairs, was performs anti-poaching activities and constant control of fisheries regulations compliance, combat illegal catches and conduct surveillance of probable sites of poachers (FAO, 2009). In 2008, 164 cases of violation of fishery regulations (not limited to *H. huso*) were identified (FAO, 2009).

The fishing industry was reported to be centralised, with three large companies trading sturgeon (WWF, 2010). The caviar industry was reported to be mainly controlled by the Czech-Azerbaijani consortium TIC HU (Carocci, 2004). The restocking programme initiated by the former Soviet Union in the 1960s was considered to have been particularly important for *H. huso* (TRAFFIC International *et al.,* 2000). Four sturgeon hatcheries were reported to operate in Azerbaijan; forming a stock of mature sturgeon was considered to be a priority due to the decline in number of mature individuals spawning in rivers (WWF, 2010).

BULGARIA

Distribution in range State: *H. huso* was reported to occur in the Danube River and along the Bulgarian section of the Black Sea (A. Tsekov *in litt*. to UNEP-WCMC, 2011), where it forms part of the Black Sea population, breeding in spring (early April) and in autumn (end of September) (CITES Management Authority of Bulgaria, cited in TRAFFIC International *et al*., 2000).

Its principal spawning sites in the Danube River are situated between 863 km (The Iron Gates 2) and 755 km (the Island of Petrich) (Jivkov *et al.,* 2003; T. Slaveykova in litt. to UNEP-WCMC, 2011), with 13 reported between the villages of Vrav and the Island of Petrich (Zhivkov *et al*., 2001, cited in A. Tsekov *in litt*. to UNEP-WCMC, 2011).

Population trends and status: Detailed studies on the number, age-size composition, migration, distribution and reproduction of *H. huso* have not yet been conducted in Bulgaria,

although studies of some populations have been undertaken (A. Tsekov, *in litt.* to UNEP-WCMC, 2011).

Based on catches of the countries of the lower sector of the Danube river, the CITES Management Authority of Bulgaria (T. Slaveykova in litt. to UNEP-WCMC, 2011) estimated that the breeding population of *H. huso* may be around 1500-3000 individuals, with probably less than one quarter able to reach spawning sites. The use of natural spawn sites in the Danube River was considered to be far from optimal (Jivkov *et al.,* 2003).

Stocks of *H. huso* were considered to have "drastically decreased" in the lower Danube River (Bloesch, 2004). However, according to official statistics, *H. huso* made up 79 per cent of sturgeon catches in the Bulgarian section of the Danube between 1995 and 2002 (Jivkov *et al.,* 2003). In the Bulgarian section of the Black Sea, *H. huso* accounted for 85.4 per cent of sturgeon catches during the same period (Jivkov *et al.,* 2003). This contrasts with catch data up to the middle of the 20th century, which, although incomplete, suggested that 90 per cent of catches were of *Acipenser gueldenstaedtii* and *A. stellatus* (A. Tsekov *in litt.* to UNEP-WCMC, 2011).

H. huso is not listed in the Red Book of Bulgaria (A. Tsekov *in litt.* to UNEP-WCMC, 2011).

Threats: Wild sturgeon populations were reported to be threatened by: low population numbers due to historic overexploitation; poaching; a decrease in the number of spawning grounds in the Danube River; a shortening of the migration route of the species; high levels of pollution and in the lower Danube and the Black Sea (Bacalbasa-Dobrovici, 1997; CITES MA Bulgaria, *in litt.* in TRAFFIC International *et al.,* 2000; ICPDR, 2007; A. Tsekov *in litt.* to UNEP-WCMC, 2011; T. Slaveykova *in litt.* to UNEP-WCMC, 2011; Zaitsev, 1992).

Selective catch of sexually-mature fish and incidental catch of young migrating sturgeon in unregulated fisheries has disrupted the age composition of the populations (CITES MA Bulgaria, *in litt.* in TRAFFIC International *et al.,* 2000). The critically low population size also disrupted the reproductive process, with some natural hybridisation with other sturgeon species (A. Tsekov *in litt.* to UNEP-WCMC, 2011).

Trade: According to data in the CITES Trade Database, exports reported by Bulgaria 2000-2010 principally comprised caviar traded for commercial purposes, the majority of which was wild-sourced (Table 7). Trade in wild-sourced caviar ceased in 2007. In addition, Bulgaria also reported the export of meat for commercial purposes and importers reported small amounts of trade in live specimens for commercial purposes (source 'F'). All annual reports for the period 2000-2010 have been received from Bulgaria. According to the Caviar Database, a total of 888.8 kg of *H. huso* caviar was exported by Bulgaria over the period 2006-2011 (Table 9), mostly for commercial purposes.

Between 2000 and 2010, Bulgaria published export quotas for wild-taken caviar and caviar originating from aquaculture (Table 8). Bulgaria appears to have possibly exceeded its export quota for wild-sourced caviar in 2000, in 2002 and in 2005. Trade in caviar from aquaculture appears to have been within quota for all years except 2006.

Re-exports originating in Bulgaria 2000-2010 consisted primarily of caviar traded for commercial purposes. Re-exports recorded within the Caviar Database comprised a total of 782.2 kg of *H. huso* caviar, of which 89 per cent was captive-bred and the remainder wild-sourced; wild-sourced trade ceased in 2008. All re-exports reported in the Caviar Database were for commercial purposes.

Statistics from the FAO fisheries department (FAO, 2011b) indicated no capture production from Bulgaria since 2007 (Table 10). Aquaculture production commenced in 2005 and was reported almost every year since (FAO, 2011b). Trade statistics from the Executive Agency

for Fisheries and Aquaculture indicated that trade in captive-bred *H. huso* appeared to increase in 2010 as did the wild catch of the species (Table 11). No data on illegal trade were available. (T. Slaveykova *in litt.* to UNEP-WCMC, 2011). Data from the National Agency for Fisheries and Aquaculture showed that during the period 2006-2010, legal *H. huso* catches were 1.94 tonnes, and the average annual catch 1995-2001 was 21.2 tonnes (A. Tsekov *in litt.* to UNEP-WCMC, 2011).

Table 9. Direct exports of *Huso huso* caviar from Bulgaria as recorded in the Caviar Database, 2005-2011. (No trade was reported in 2005, 2007 or 2008).

Source	2006	2009	2010	2011	Total
W	565.8				565.8
C	300.0	2.0	14.3	6.6	323.0

Source: Caviar Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Table 10. FAO statistics for *H. huso* capture and aquaculture production in Bulgaria 1995-2009. (Source: FAO, 2011b).

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Black Sea capture production (tonnes)	4	5	11	12	10	1	00	4	1	3	1	-	-	-	-
Inland waters capture production (tonnes)	21	24	31	31	27	18	7	10	8	10	13	6	0	0	0
Aquaculture – inland waters (tonnes)	-	-	-	-	-	-	0	0	0	0	7	28	46	-	0.2

Table 11. Trade statistics for *H. huso* in Bulgaria, as provided by the Executive Agency for Fisheries and Aquaculture. All quantities are given in kg. (Source: T. Slaveykova *in litt.* to UNEP-WCMC, 2011).

Trade term/Year	2008	2009	2010
Meat (aquaculture)	0	1	115
Caviar (aquaculture)	487	353	600
Total catch of caviar in Danube River	260	230	790

Seizures of 27.5 kg caviar originating in or transiting through Bulgaria 2000-2009 were reported by Kecse-Nagy (2011), including 8 kg *Huso huso* in 2009.

Table 7. Direct trade in *Huso huso* from Bulgaria, excluding seizures/confiscations, 2000-2010 (quantities rounded to the nearest tenth of a kg, where applicable). (No trade was reported in 2007 or 2008.)

Source	Term	Units	Reported by	2000	2001	2002	2003	2004	2005	2006	2009	2010	Total
W	caviar	kg	Exporter	2747.5	991.6	2327.8	1548.4	919.9	1420.5	666.7			10622.3
			Importer	2127.6	1303.0	1971.0	1363.0	1008.8	1587.5	666.7			10027.6
	meat	kg	Exporter			200.0							200.0
			Importer			350.0							350.0
C	caviar	kg	Exporter					40.5	113.6	381.6	2.0		537.7
			Importer					40.5	85.6	215.0	2.0		343.1
	eggs (live)	kg	Exporter									4	4
			Importer										
F	live	kg	Exporter				6						6
			Importer										
		-	Exporter							30			30
			Importer										

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Table 8. CITES export quotas for *Huso huso* caviar originating in Bulgaria by source and associated global trade, 2000-2011. (Quantities rounded to the nearest tenth of a kg, where applicable. Trade data not yet available for 2011.)

Source		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
W	Quota* (kg)	2500	2450	1720	1720	1720	1460	1000	-	0#	0#	0#	0#
	Reported by Exporter (kg)	2747.5	991.6	2327.8	1548.4	919.9	1420.5	666.7					
	Reported by Importer (kg)	2127.6	1303.0	1971.0	1363.0	1008.8	1587.5	666.7					
C	Quota* (kg)					100		300	350				
	Reported by Exporter (kg)					40.5	113.6	381.6			2.0		
	Reported by Importer (kg)					40.5	85.6	215.0			2.0	5.4	

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

* From 2008 onwards the quota year runs from 1st March to 28th February of the following year, whilst trade is reported by calendar year

No export quota communicated to the Secretariat

Management: A total ban on sturgeon fishing in the Black Sea was implemented in 2007, 2008 and 2011; this was extended to include the Danube River in May 2011 (T. Slaveykova in litt. to UNEP-WCMC, 2011), as a prelude to a five year ban scheduled for 2012 (ICPDR, 2011; A. Tsekov *in litt.* to UNEP-WCMC, 2011).

Sturgeon catches in Bulgaria are managed by the National Agency for Fisheries and Aquaculture at the Ministry of Agriculture (A. Tsekov *in litt.* to UNEP-WCMC, 2011). The main sources of information for non-detriment findings in Bulgaria are the 'Action plan for sturgeon species in the Bulgarian area of the Danube River and the Black Sea' (Zhivkov *et al*., 2001) and information from the Executive Agency for Fisheries and Aquaculture (T. Slaveykova in litt. to UNEP-WCMC, 2011).

The CITES MA of Bulgaria provided information on three pieces of legislation providing protection to *H. huso:*

- Article 41 of the Biodiversity Act provides protection and regulates the use of the species, prohibiting the use of specified non-selective gear and fishing methods;
- the Fisheries and Aquaculture Act regulates the use, method and timing of fishing, the equipment and conditions, a fish trading system for reporting and control, and conservation of fisheries resources;
- the 'Ordinance for a year-round ban on fishing in the Black Sea and Danube' defined a ban on fishing of sturgeon in the Black Sea in 2007 and 2008, no ban in 2009 and 2010 and a ban on the Black Sea and Danube River in 2011 (T. Slaveykova in litt. to UNEP-WCMC, 2011).

Bulgaria was reported to produce *H. huso* by aquaculture (Bronzi, 2007), and the first *H. huso* generation from artificial reproduction was in May 2008 (Tsekov *in litt.* to UNEP-WCMC, 2011). Two fish farms exclusively producing sturgeon meat were reported to operate in the country and a further four produced sturgeon meat as a side product (Bronzi, 2007).

Bulgaria stocked 41 000 young *H. huso* into the Danube River between 1998 and 2005, and at a level of 5000 *H. huso* after 2006 (DDNI, 2011). According to an Order of the Ministers of Agriculture and Forestry and of the Environmental Protection and Waters, restocking of between 30 and 120 fish was required for each kilogram of caviar exported. Consequently, during 2006 and 2008 when caviar export quotas were not established, export companies were not obliged to restock and no restocking took place (Hubenova *et al.,* 2009). Since 2008, restocking was the main task for the National Program for Support of the Stable Growth of Fish Resources, releasing 20 000 *H. huso* in 2008 (Hubenova *et al.,* 2009). However, the CITES MA of Bulgaria stated that stocking was discontinued after the ban on production of caviar from wild-caught specimens (T. Slaveykova in litt. to UNEP-WCMC, 2011).

GEORGIA

Distribution in range State: The southeast coast of the Black Sea is an important feeding and wintering area for sturgeon (including *H. huso*) that migrate upstream for spawning, the main rivers being the Supsa, Inguri, Chorokhi and the Rioni (Georgia, 2010; Zarkua and Tsuladze, 1999, cited in TRAFFIC International *et al*., 2000). The only sturgeon spawning ground in Georgia was reported to be the Rioni, which was reduced from 57 km in 1922 to 9 km in 2007 (Guchmanidze, 2009).

Population trends and status: Historically low numbers were recorded for all sturgeon species in Georgian waters during a 2007 assessment (Guchmanidze, 2009; WWF, 2010) and, accordingly, all sturgeon species were included in the Red List of Georgia (Georgia, 2010). Based on a study implemented during the period 2006-2008, the number of *H. huso* in

Georgia was estimated to be 2 918 (Guchmanidze, 2009). Spawners were reported to comprise 6.09 per cent of the population (40 per cent female and 60 per cent male) (Guchmanidze, 2009).

Sturgeon population declines were reported to have slowed during the 16 years prior to 2009 as a result of reduced poaching and pollution of sturgeon habitat (Guchmanidze, 2009).

Threats: The main threats were considered to be the destruction of habitats, in particular the construction of a hydroelectric power station; pollution; and sand-gravel extraction (Guchmanidze, 2009; Georgia, 2010). Declines were also attributed to timber rafting, poaching and unsustainable fishing (Guchmanidze, 2009).

Trade: According to data in the CITES Trade Database and the Caviar Database, no trade originating in Georgia was reported 2000-2010. With the exception of 2004, all annual reports to CITES have been received from Georgia. The market for sturgeon products in Georgia was reported to be small, although the demand may be partly met by illegal catch and imports from Azerbaijan and Armenia (WWF, 2010).

Management: The Management Authority of Georgia stated that no harvesting of sturgeon was permitted in Georgia, except for scientific purposes; additionally a five mile no-fishing zone for all species was established along Georgia's part of the Black Sea Coast (AC17 Doc. 7.1).

The study and monitoring of sturgeons in Georgia includes the project "Research on Sturgeon Conservation Status in Georgia", implemented during the years 2006-2008 (Guchmanidze, 2009). Georgia was reported to have started a sturgeon restocking programme (AC17 Doc. 7.1), although it is not clear whether this includes *H. huso*. Sturgeon aquaculture was considered to be underdeveloped in Georgia (WWF, 2010).

HUNGARY

Distribution in range State: H. huso was reported to have "practically vanished" (Guti, 2008) or to be extinct (Kottelat *et al*., 2009).

Population trends and status: Historically, *H. huso* migrated from the Black Sea to the upper part of the Hungarian section of the Danube; however individuals of the species only exceptionally overcome the dams on the river (Hensel and Holcík, 1997). The species has been recorded in just two catches in Hungary since the opening of the Iron Gate Dam I (Guti, 2008), the most recent being in 1987 (AC24 Doc. 7.5 Annex; K. Levente pers. comm. to UNEP-WCMC, 2011).

Threats: As the species' is likely to be extinct, the CITES Management Authority of Hungary considered current threats to *H. huso* not to be applicable to Hungary (K. Levente pers. comm. to UNEP-WCMC, 2011).

Trade: According to data in the CITES Trade Database, trade from Hungary between 2000 and 2010 comprised the export of 120 live individuals (source 'F') for commercial purposes in 2009 and two captive-bred specimens for scientific purposes in 2000. No trade originating in Hungary has been reported in the Caviar Database. All annual reports for the period 2000-2010 have been received from Hungary.

Management: The species was reported to be legally protected by the Nature Conservation Act No. 53 of 1996 and Ministerial Decree No. 13/2001 on protected and strictly protected species (AC24 Doc. 7.5 Annex; K. Levente pers. comm. to UNEP-WCMC, 2011). In 2009, aquaculture in Hungary was reported to comprise a captive population of 23 specimens, kept by one single operation (AC24 Doc. 7.5 Annex).

THE ISLAMIC REPUBLIC OF IRAN

Distribution in range State: It has been suggested that the species may no longer spawn naturally in Iranian waters (Kottelat and Freyhof, 2007), however, the CITES SA of Iran (M. Pourkazemi, *in litt.* to UNEP-WCMC, 2011) confirmed that *H. huso* entered large rivers such as the Sefidrud and Gorganrud rivers to spawn.

Population trends and status: Between 1904 and 1913, *H. huso* accounted for about 40 per cent of the sturgeon catch, whereas by 2004 it accounted for no more than 10 per cent (Abdolhay, 2004). Estimates of catch per unit effort for *H. huso* from gillnets were reported to have declined from 0.501 in 1998 to 0.157 in 2008 (M. Pourkazemi *in litt.* to UNEP-WCMC, 2011).

Since 2002, Iran has conducted sturgeon stock assessments using trawl surveys (Table 12) to estimate abundance and biomass, although concern has been expressed about the methodology used including: *H. huso* is a pelagic fish whereas trawls collect samples from along the bottom; the bottom trawl method is not appropriate for large fish; and surveys are currently conducted in summer whereas *H. huso* migrates to the south Caspian Sea in early spring (M. Pourkazemi *in litt.* to UNEP-WCMC, 2011). The absence of large and adult specimens in the catch composition was attributed to the inappropriate fishing gear and timing of the survey.

Table 12. Number of specimens, catch per unit effort (CPUE), abundance and biomass of *H. huso* caught using bottom trawls in the marine stock assessment surveys from 2002 through 2005. (Source: M. Pourkazemi *in litt.* to UNEP-WCMC, 2011).

Season	No. of specimens caught*	CPUE	Abundance (thousand specimens)	Biomass (tons)
Spring 2002	1	0.01	52	1300
Autumn 2003	2	0.03	192.3	10767.2
Summer 2004	4	0.05	297.146	5824.232
Winter 2005	3	0.04	350.151	7916.232

* No *H. huso* specimens were caught during the winter surveys of 2003 and 2004, summer survey of 2005 and the winter and summer surveys of 2008 and 2010.

Mean length and mean weight of specimens caught in research studies and catch data indicate that the average size of specimens caught may have increased slightly in recent years (Table 13).

Table 13. Mean fork length and weight of *H. huso* from the Islamic Republic of Iran 1998-2010. (Source: M. Pourkazemi *in litt.* to UNEP-WCMC, 2011).

Mean weight (kg)	Mean fork length (cm)	Year
108.7	212.5	1998
92.8	200.8	1999
85.2	196.2	2000
92.2	203.7	2001
98.8	208	2002
116.2	216.2	2003
104.6	205.7	2004
106.2	210.1	2005
120.3	215.1	2006
109.0	210.5	2007
120.5	217.4	2008
132.4	223.6	2009
146.6	228.9	2010

Threats: Oil and industrial pollution were considered to threaten fisheries in the region (Abdolhay, 2004). Dams on the Tajan, Gorganrud and Sefidrud rivers were reported to have impacted sturgeon spawning grounds (Pourkazemi, 2006).

Trade: According to the CITES Trade Database, direct exports reported by Iran 2000-2010 consisted principally of wild-sourced caviar and meat (Table 14), mostly traded for commercial purposes, with small quantities recorded as personal possessions and scientific purposes. According to data in the Caviar Database, Iran reported the direct export of a total of 2740.5 kg of wild-sourced caviar for commercial purposes between 2005 and 2011: 594 kg in 2005 kg, 897 kg in 2007, 450 kg in 2008 and 799.5 kg in 2010.

With the exception of 2010, all annual reports to CITES have been submitted by Iran; however, from 2005 onwards, Iran has noted that annual reports do not contain information on trade in Acipenseriformes; copies of caviar permits have been sent to UNEP-WCMC (via the CITES Secretariat) separately for entry into the Caviar Database, with the most recent permits received in February 2011.

Between 2000 and 2010, Iran published export quotas for wild-sourced *H. huso* (Tables 15 and 16) and captive-bred specimens. According to CITES trade data, Iran appears to have exceeded its export quota for wild-sourced caviar in 2000, 2003, 2006 and 2007 and for wild source meat in 2006.

Re-exports of *H. huso* originating in Iran, as recorded within the CITES Trade Database 2000-2010, primarily comprised wild-sourced caviar traded for commercial purposes. Wild-sourced meat accounted for a high proportion of indirect trade.

Table 14. Direct trade in *Huso huso* from Iran, 2000-2010 (quantities rounded to the nearest tenth of a kg, where applicable). (No trade was reported in the CITES Trade Database for 2010)

Source	Term	Units	Reported by	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
W	caviar	kg	Exporter	3454	2082	2641.5	2566.3	791	18					11552.7
			Importer	2011.8	2218	2491.3	2418.5	939	696.5	0.7	1020.1	450		11795.9
	meat	kg	Exporter	39451.6	25096.5	17222.9	13749.8	100						95620.7
			Importer	45681.2	15068	21165.6	16648.8	12715		12000		1500		124778.6
	skins	-	Exporter			20	60							80
			Importer			20			116					136
		m^2	Exporter	1.0	0.5									1.5
			Importer											
	swim bladders	kg	Exporter		78									78
			Importer	78	78									156
	bodies	-	Exporter				1							1
			Importer				1							1
I	caviar	kg	Exporter											
			Importer	250			1		1.3	0.7	5.1	1.4	1.8	261.2

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Table 15. CITES export quotas for wild-sourced *Huso huso* caviar originating in Iran and associated global trade, 2000-2011 (quantities rounded to the nearest tenth of a kg, where applicable). (No annual report has yet been received from Iran for 2010. Trade data not yet available for 2011.)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Quota* (kg)	3000	3950	2950	2130	1065	1065	-	1000	1000	0#	800	0#
Reported by Exporter (kg)	3454.0	2082.0	2641.5	2566.3	791.0	*594*		*847*	*450*		*799.5*	
Reported by Importer (kg)	2011.8	2218.0	2491.3	2418.5	939.0	696.5	0.7	1020.1	450.0	125.0		

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK.

Figures in italics for 2005, 2007, 2008 and 2010 reflect trade recorded within the Caviar Database; quantities for 2008 and 2010 have been adjusted to account for the quota year.

* From 2008 onwards the quota year runs from 1st March to 28th February of the following year, whilst trade is reported by calendar year

No export quota communicated to the Secretariat

Table 16. CITES export quotas for wild-sourced *Huso huso* meat originating in Iran and associated global trade, 2000-2011 (quantities rounded to the nearest tenth of a kg, where applicable). (No annual report has yet been received from Iran for 2010. Trade data not yet available for 2011.)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Quota* (kg)		75000	60000	26600	13300		-	16385	16385	0#	15385	0#
Reported by Exporter (kg)	39451.6	25096.5	17222.9	13749.8	100.0							
Reported by Importer (kg)	45681.2	15068.0	21165.6	16648.8	12715.0		12000.0		1500.0			

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

* From 2008 onwards the quota year runs from 1st March to 28th February of the following year, whilst trade is reported by calendar year

No export quota communicated to the Secretariat

Table 17. CITES export quotas for wild-sourced *Huso huso* skins originating in Iran and associated global trade, 2000-2010 (quantities rounded to the nearest tenth of a kg, where applicable). (No export quotas were published or trade reported 2000-2001 or 2006-2010; no annual report has yet been received from Iran for 2010.)

	2002	2003	2004	2005
Quota*	500	400	200	
Reported by Exporter (kg)	20	60		116
Reported by Importer (kg)	20			

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Management: The management of fisheries in Iran was reported to be characterised by a well-developed partnership between Government and private sector, with legislation under the control of Shilat, the Iran Fisheries Company (Carocci, 2004; Morgan 2006; Speer *et al*., 2000). M. Pourkazemi (*in litt*. to UNEP-WCMC, 2011) provided the following information on fisheries manangement in Iran:

> "all activities related to sturgeons including catch and processing of sturgeons, trade and export, conservation of resources and breeding and rearing of sturgeons as well as all activities related to the hatchery production of sturgeon fingerlings is controlled and regulated by the Iranian Fisheries, a Government Organization. With regard to this everyone engaged in activities related to sturgeons are government employees and all rules and regulations pertaining to catch are strictly adhered. Time and place of catch and fishing gear to be used are communicated by the Iranian Fisheries and all fishers are obliged to follow them. All fishing activities are supervised and controlled by the Iranian Fisheries. Sturgeon meat and caviar is under the monopoly of the Government of the I.R. of Iran and the trade of sturgeon meat and caviar in the local markets is considered illegal and the source of this illegal trade is immediately identified."

Iran has put in place a ban on commercial sturgeon catch in the Caspian Sea (at the Sturgeon and Paddlefish CITES working group; M. Pourkazemi, pers. comm. to UNEP-WCMC, 2011); the CITES Secretariat encouraged Iran to submit to the Secretariat a notification concerning their ban on commercial sturgeon fishing in the Caspian Sea (IISD, 2011; AC25 Summary Record).

Sturgeon fishing regulation in Iran was reported to include the requirement of a license, fishing restricted to a few stations and only in the open season in spring (Raymakers, 2002a). Catch and export of *H. huso* in Iran are based on the management of stocks and on a policy to decrease catch efforts through decreasing the number of catch days, gillnets and boats (M. Pourkazemi *in litt*. to UNEP-WCMC, 2011). To protect stocks and comply with regulations on catch and export quotas, catch figures for *H. huso* in Iran 1998-2010 have been greatly reduced (M. Pourkazemi *in litt*. to UNEP-WCMC, 2011; Table 18).

Table 18. Catch and caviar harvests of *H. huso* from the Islamic Republic of Iran 1998-2010. (Source: M. Pourkazemi *in litt*. to UNEP-WCMC, 2011).

2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	Product
32	34	52	83	74	74	73	52	67	88	125	128	149	Catch (tons)

A security system of coastal guards for the protection and conservation of aquatic resources has been established (M. Pourkazemi, pers. comm. to UNEP-WCMC, 2011). In 2008, the fishery guard was reported to have seized 1948 kg of sturgeon and 28.6 kg of caviar and to have released thousands of immature and undersized sturgeons caught as by-catch (FAO, 2009). Strict control is enforced on fishing gear and catch season for sturgeons, in compliance with regulations outlined by the Fisheries Research Organisation (M. Pourkazemi *in litt*. to UNEP-WCMC, 2011). Regarding sturgeon caught as by-catch, immature specimens are immediately released back into the sea and mature specimens are handed over to sturgeon hatcheries or rehabilitation centres, with a representative of Iranian Fisheries always present (M. Pourkazemi *in litt*. to UNEP-WCMC, 2011).

Conservation of *H. huso* stocks was reported to be one of the main objectives of the Iranian Fisheries Organization, with the number of fingerlings released into the Caspian Sea over the last 10 years totalling 89 000 000 (M. Pourkazemi *in litt*. to UNEP-WCMC, 2011). *H. huso* fingerlings are released at 10, 20 and 35 g, giving them a greater chance of survival (M. Pourkazemi *in litt*. to UNEP-WCMC, 2011).

H. huso was reported to be the main sturgeon species used for commercial farming in Iran, with permits issued for the production of 2700 tons of meat and 80 tons of caviar (M. Pourkazemi *in litt.* to UNEP-WCMC, 2011). So far, the maximum amounts marketed have been 343 tons of meat and 50 kg of caviar (Table 19; M. Pourkazemi *in litt.* to UNEP-WCMC, 2011).

Table 19. Farmed meat and caviar production of *H. huso* from the Islamic Republic of Iran 1999-2009. (Source: M. Pourkazemi *in litt.* to UNEP-WCMC, 2011).

2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	Year / Number
343	17	15	11	0	0	0	0	0	0	0	Meat (ton)
50	13	0	0	0	3.5	0	0	0	0	0	Caviar (kg)

KAZAKHSTAN

Distribution in range State: *H. huso* migrates into brackish waters of the Caspian Sea and spawns naturally in the Ural River in Kazakhstan, where spawning sites have remained intact due to the absence of dams (Khodorevskaya *et al.*, 1997; Billard and Lecointre, 2001). The wild distribution of the species was reported to now be restricted to this river (Chebanov *et al.*, 2011).

Population trends and status: Billard and Lecointre (2001) commented that the Ural's population remained abundant. However, 2500 H. huso spawned in the Ural River in 2002, compared with tens of thousands that would historically spawn each year (Doukakis et al., 2010). Since 1979, the number and biomass of H. huso entering the Ural exceeded those entering the Volga (Khodorevskaya et al., 1997).

Catches of *H. huso* in Kazakhstan in the early 1930s did not exceed 1000 tonnes per year; after the 1962 moratorium at sea, this species was harvested in the Ural River at a rate of about 400-600 tonnes per year (Khodorevskaya *et al.*, 2009), peaking at over 750 tonnes in the mid 1960s (Doukakis *et al.*, 2010). However, the spawning stock in this river decreased since 1987, with the annual average catch not exceeding 50 tonnes (Khodorevskaya *et al.*, 2009) and decreasing to 27 tonnes in 2007 (Mamina, 1995 and unpublished data of the Research and Production Center of Fish Industry, cited in Doukakis *et al.*, 2010).

Threats: Possible threats specific to Kazakhstan were reported to be pollution from oil fields, especially the Tengiz oil field (Sagers, 1994, cited in TRAFFIC International *et al.*, 2000) and radioactive contamination from a nuclear reactor (Dumont, 1995).

Trade: According to data in the CITES Trade Database, direct exports reported by Kazakhstan 2000-2010, consisted principally of wild-sourced meat and caviar traded for commercial purposes (Table 21). The volume of caviar traded during in the first half of the period (2000-2005) was notably higher than levels reported 2006-2010. Kazakhstan has not yet submitted an annual report to CITES for 2008, 2009 or 2010. According to data in the Caviar Database, Kazakhstan reported the direct export of a total of 7393.7 kg of wild-sourced *H. huso* caviar for commercial purposes between 2004 and 2011 (Table 22).

Between 2000 and 2010, Kazakhstan published export quotas for wild-sourced caviar and meat (Tables 23 & 24). According to data in the CITES Trade Database, the quota was apparently exceeded in 2001, 2005, 2006 (no quota) and 2009 (zero quota). Permits received for entry into the Caviar Database corroborate the 2005 quota excess. In 2006, 199 kg of caviar was reportedly imported despite the recommendation to Parties not to accept imports; however, this trade may have taken place prior to the recommendation being issued (April 2006). In 2009, the zero export quota was apparently exceeded by 436.5 kg according to the importer, although this trade may have occurred in the 2008 quota year (no

permit date available).

Indirect trade in *H. huso* originating in Kazakhstan 2000-2010 consisted exclusively of caviar, the vast majority was wild-sourced, and virtually all was for commercial purposes. According to data in the Caviar Database, a total of 2438.0 kg of wild-sourced *H. huso* caviar originating in Kazakhstan was re-exported for commercial purposes between 2004 and 2010.

Statistics from the FAO fisheries department (FAO, 2011b) indicated the *H. huso* capture production from Kazakhstan between 2002 and 2009 totalled 281 tonnes (Table 25).

Management: Kazakhstan was reported to have put in place a total ban on sturgeon fishing in 2010 (Anonymous, 2010, cited in Sharov, 2011; M. Pourkazemi, pers. comm. to UNEP-WCMC, 2011).

The most important fisheries laws are the Law on Protection, Recovery and Use of Wild Life and the Law on Specially Protected Natural Areas (FAO, 2009). The 'Ministerial Decree #493 of 29 April 2004, Regulating trade of caviar of sturgeons species manufactured in the Republic of Kazakhstan', was reported to have been issued to control trade of sturgeon caviar and prevent its illegal turnover (FAO, 2009).

There are two fishing seasons, one during spring spawning and the other during winter migration. Fishing gear, the number of nets set, and size of fish harvested are regulated and a fishing license is required. Fishing grounds are limited to twelve on the Ural River and eight on the Kigach River. The purchase price at the landing site was based on a fixed legal rate of caviar weight extracted per female; *H. huso* was set at 19.4per cent of the total body weight (TRAFFIC International *et al.,* 2000). During spawning migration, patrols are undertaken in the Ural-Caspian to curtail poaching and protect valuable species (FAO, 2009). During 2008 inspections, more than 3500 cases of fisheries violations (not limited to *H. huso*) were detected; 2475 kg of sturgeon and 6.5 kg of caviar were seized (FAO, 2009).

In a recent analysis in the Ural River, Doukakis *et al*. (2010) advised that harvest rates were 4-5 times higher than rates needed to sustain population abundance. They noted that the fishery was dominated by first-time spawners, and recommended that yield would be maximised by raising minimum size limits and reducing illegal take of subadults.

Two hatcheries, Uralo-Atyrau and Atyurau, were reported to have been operational since 1998, with annual release of *H. huso* rising from 300 000 to over 2 million fingerlings per year between 1998 and 2002 (CITES Secretariat, 2003). A total of approximately 13.2 million *H. huso* fingerlings were reported to have been produced at the Atyrau hatchery during the period 1998-2009 (Thorpe *et al.,* 2010).

Table 21. Direct exports of *Huso huso* from Kazakhstan, 2000-2010 (quantities rounded to the nearest tenth of a kg, where applicable). (No trade was reported in 2010.)

Source	Term	Units	Reported by	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
W	caviar	kg	Exporter	6778.7	7135.6	3473.3	1084.0	693.1			949.5	949.8		21064.0
			Importer	5545.7	7392.2	2393.5	457.1	209.0	4602.6	198.9	531.0	1286.4	436.5	23052.9
	meat	kg	Exporter		5000	2100	36610			15000	4084			62794
			Importer											
	specimens	-	Exporter			20								20
			Importer											
I	caviar	kg	Exporter											
			Importer		581.6	1.4					0.2	1.2	1.3	585.7

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Table 22. Direct exports of *Huso huso* caviar from Kazakhstan as recorded in the Caviar Database, 2004-2011. All exports were wild-sourced and for commercial purposes. (No permits have been received for 2006 or 2009-2011.)

	2004	2005	2007	2008	Total
caviar (kg)	693.1	4801.3	949.5	949.8	7393.7

Source: Caviar Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Table 23. CITES export quotas for wild-sourced *Huso huso* caviar originating in Kazakhstan and associated global trade in wild-sourced caviar as reported by Kazakhstan and the importing countries, 2000-2011 (quantities rounded to the nearest tenth of a kg, where applicable). (Annual reports have not yet been received from Kazakhstan for 2008, 2009 or 2010. Trade data not yet available for 2011.)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Quota* (kg)	8300	3600§	5616§	8431.8§	2360	2555§	-	1700§	1700§	0#	1500§	0#
Reported by Exporter (kg)	6778.7	7135.6	3473.3	1084.0	693.1	*4801.3*		949.5	949.8			
Reported by Importer (kg)	5545.7	7392.2	2393.5	457.1	209.0	4602.6	198.9	531.0	1286.4	436.5		

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK
Figure in italics for 2005 reflects trade recorded within the Caviar Database
* From 2008 onwards the quota year runs from 1st March to 28th February of the following year, whilst trade is reported by calendar year
# No export quota communicated to the Secretariat
§ Excludes quota allocated to Turkmenistan

Table 24. CITES export quotas for wild-sourced *Huso huso* meat originating in Kazakhstan (Caspian Sea population) and associated global trade in wild-sourced meat as reported by Kazakhstan and the importing countries, 2000-2011 (quantities rounded to the nearest tenth of a kg, where applicable). (Annual reports have not yet been received from Kazakhstan for 2008, 2009 or 2010. Trade data not yet available for 2011.)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Quota* (kg)	56000	24800§	23950§	51600§	52100	27000§		21900	21400§	0#	15900§	0#
Reported by Exporter (kg)		5000	2100	36610			15000	4084				
Reported by Importer (kg)												

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK
* From 2008 onwards the quota year runs from 1st March to 28th February of the following year, whilst trade is reported by calendar year
# No export quota communicated to the Secretariat
§ Excludes quota allocated to Turkmenistan

Table 25. FAO statistics for *H. huso* capture production in Kazakhstan 2002-2009. (Source: FAO, 2011b).

Year	2002	2003	2004	2005	2006	2007	2008	2009
Quantity (tonnes)	58	64	6	2	36	27	46	42

RUSSIAN FEDERATION

Distribution in range State: *H. huso* was reported to occur in the Caspian Sea, the Volga River and the Sea of Azov (Kottelat and Freyhof, 2007). The species was believed to no longer use the Terek and Sulak Rivers (Khodorevskaya *et al.*, 1997).

Population trends and status: Natural reproduction of *H. huso* in the Volga river declined following construction of the Volgograd dam, with the amount of spawners harvested annually decreasing from 630 tonnes in 1991 to 140 tonnes in 1995 (Khodorevskaya *et al.*, 1997; Ivanov *et al.*, 1999; Kottelat *et al.*, 2009); similarly, decreases in spawning numbers were reported from 26 000 over the period 1961-1965 to 2800 over the period 1996-2002 (Khodorevskaya *et al.*, 2009). In 2000, it was reported that fishermen had been unable to find enough sturgeon to meet their quotas (Speer *et al.*, 2000).

In an effort to counter declines, the Soviet Union initiated an extensive stocking program in the early 1950s that, together with strict control of the fishery, maintained harvests (Vecsei *et al.*, 2002). Declines in natural reproduction placed increasing reliance on artificial reproduction, yet by the mid-1990s, several hatcheries along the Volga River were reported to have closed due to lack of funding and insufficient numbers of broodstock, which led to "a severe decline in the number of young fish released and an inability to compensate for the lack of natural reproduction" (Graham and Murphy, 2007).

Observations of individuals from the Volga River revealed that spawning migrations comprised almost entirely first-time spawners (Vecsei *et al.*, 2002). Populations in the Sea of Azov were believed to consist entirely of hatchery-reared fish (Volovik *et al.*, 1993, cited in TRAFFIC International *et al.*, 2000).

Threats: Uncontrolled overfishing and poaching were major threats to sturgeons in the northern part of the Caspian Sea basin (Khodorevskaya *et al.*, 1997). Water pollution was also a threat (Dumont, 1995; Khodorevskaya *et al.*, 1997).

Trade: According to the CITES Trade Database, direct exports 2000-2010 were reported by the Russian Federation in 2000 and 2001, and consisted of wild-sourced caviar and meat exported for commercial purposes (Table 26). Imports of wild-sourced caviar were reported by trading partners in all years 2000-2007. With the exception of 2006, all annual reports to CITES have been received from the Russian Federation. No trade originating in the Russian Federation has been recorded within the Caviar Database.

Between 2000 and 2010, the Russian Federation published export quotas for wild-sourced *H. huso* caviar (Table 27), meat, food and canned products and, in the year 2000, quotas for caviar and meat originating in Azerbaijan but re-exported via the Russian Federation. According to data in the CITES Trade Database 2000-2010, exports of wild-sourced caviar were within the quota in every year, with the exception of 2006 (Table 27).

Re-exports of *H. huso* originating in the Russian Federation between 2000 and 2005 consisted principally of wild-sourced caviar (2961.9 kg as reported by re-exporters), with the majority for commercial purposes. No indirect trade in wild-sourced caviar has been recorded since 2007.

Statistics from the FAO fisheries department (FAO, 2011b) indicated *H. huso* capture production from the Russian Federation 1992-2009 totalling 1689 tonnes (Table 28).

Table 28. FAO statistics for *H. huso* capture production in the Russian Federation 1992-2009. (Source: FAO, 2011b).

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Quantity (tonnes)	520	311	162	154	105	127	78	40	44	40	32	24	13	17	8	6	4	4

Table 26. Direct trade in *Huso huso* from the Russian Federation, 2000-2010 (quantities rounded to the nearest tenth of a kg, where applicable). (No trade was reported in 2010)

Source	Term	Units	Reported by	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
W	caviar	kg	Exporter	2171.9	2220.3									4392.2
			Importer	2142.2	1628.4	909.7	673.1	258.2	2.4	3.3	0.9			5618.2
	meat	kg	Exporter	786.6	2000									2786.6
			Importer											
		-	Exporter											
			Importer	37										37
C	egg (live)	kg	Exporter											
			Importer									20	20	40
	live	-	Exporter											
			Importer				14							14
I	caviar	kg	Exporter											
			Importer	32.2	187.7	0.7	1.9	2.7	10.5	9.4	1.6	1.2	3.3	251.2
	meat	kg	Exporter											
			Importer	0.1										0.1

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Table 27. CITES export quotas for wild-sourced *Huso huso* caviar originating in the Russian Federation and associated global trade in wild-sourced caviar as reported by the Russian Federation and the importing countries, 2000-2011. (Quantities rounded to the nearest tenth of a kg, where applicable. Trade data not yet available for 2011.)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Quota*◊ (kg)	3500	3800	1800	2500	800	600	-	700	700	0#	700	0#
Quota*§ (kg)									0#	0#	0#	0#
Reported by Exporter (kg)	2171.9	2220.3										
Reported by Importer (kg)	2142.2	1628.4	909.7	673.1	258.2	2.4	3.3	0.9				

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

* From 2008 onwards the quota year runs from 1st March to 28th February of the following year, whilst trade is reported by calendar year

No export quota communicated to the Secretariat

◊ Caspian Sea stock

§ Azov Sea stock

Management: Commercial harvesting of *H. huso* has been prohibited in the Russian Federation since 2000 (T.V. Vasilyeva, *in litt* to UNEP-WCMC, 2011a). The CITES Secretariat encouraged the Russian Federation to submit to the Secretariat a notification concerning their ban on commercial sturgeon fishing in the Caspian Sea (IISD, 2011; AC25 Summary Record).

Raymakers (2002a) reported that sturgeon fishing regulations in the Russian Federation included the requirement of a license, no fishing in the open sea, two closed seasons and a minimum size limit for *H. huso* of 165 cm in rivers and 180 cm in coastal waters; the author expressed concern that the open season covered the entire migrating season of sturgeon. Russian catch quotas were reported to be declared by the Federal Government following the recommendations of the State Fisheries Committee, made in consensus with an independent council of experts (Anon, 2000, cited in TRAFFIC International *et al*. 2000). Fishing for sturgeon in the Sea of Azov was reported to have been banned since 1986, with the exception of capture for breeding (Sokolov, 2010).

TRAFFIC International *et al.* (2000) noted that, from 1992 to 1997, about 50 per cent of the Russian sturgeon catches in the Caspian Sea comprised *H. huso,* however, the illegal harvest was thought to be six to ten times greater than the legal catch, with illegal fisheries mainly consumed domestically. In an effort to tackle poaching and illegal trade, the Russian government was reported to be bringing the caviar trade under State control and stiffening punishments for poachers (Faulconbridge, 2008). The Russian Federation proposed a five year moratorium on sturgeon fishing, and asked the other nations bordering the Caspian Sea to do the same (Blomfield, 2008). At an international sturgeon enforcement workshop, Vorobjiov (2006) reported that measures taken by authorities had led to substantial decrease of illegal trade level.

The Russian Federation was reported to produce seven sturgeon taxa by aquaculture, including *H. huso* (Bronzi, 2007). The country operated 250 sturgeon farms producing 3.5 tons of caviar (2400 tons of meat) during the period 2005-2006, predicted to rise to 12-15 tons of caviar (3000-4500 tons of meat) in the subsequent 5-10 years (Bronzi, 2007).

TURKMENISTAN

Distribution in range State: Kottelat *et al.* (2009) described *H. huso* as a vagrant in Turkmenistan. The species was reported to occur in the Hazar State Nature Reserve (WHC, 2009).

Population trends and status: The harvest off the coast of Turkmenistan reportedly reached a peak of 1490 tonnes in 1937, however, records after 1970 contained no information on *H. huso* catch in the region (Khodorevskaya *et al.,* 2009). Turkmenistan (2009) suggested that a loss of genetic diversity had been observed and that stocks were continuing to decrease.

Threats: Excessive fishing was reported to cause stocks to decline (Turkmenistan, 2009).

Trade: No trade originating in Turkmenistan has been recorded in either the CITES Trade Database or the Caviar Database 2000-2010. Turkmenistan is not a Party to CITES.

In accordance with the regional agreement for the management of shared stocks of sturgeon in the Caspian sea, Turkmenistan has been allocated export quotas for certain sturgeon products. However, these products are exported by neighbouring States and are included in the export quotas for these States (Table 29).

Table 29. CITES export quotas for wild-sourced *Huso huso* originating in Turkmenistan, as allocated from Kazakhstan's export quota, 2000-2011.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
caviar (kg)	-	600	340	100	-	45	-	61	61	0	0	0
meat (kg)	-	3100	1700	500	-	500	-	-	500	0	0	0

* From 2008 onwards, the quota year runs from 1st March to 28th February of the following year.

Management: Turkmenistan is a non-Party to CITES. However, the country has been represented at a number of meetings relating to sturgeons organised by CITES (CABCS, 2003; FAO, 2009).

The conservation and protection of fishery resources and aquatic animals in Turkmenistan is the responsibility of the State Fishery Protection Office (FAO, 2009) with fish protection based on the following legislation: Law on Nature Conservation; Law on Conservation and Sustainable Use of Fauna; Law on State Ecological Expertise; Law on Hydrocarbon Resources; Regulations for Protection of Fishery Resources and Fishing in Territorial Waters and Inland Water Bodies of Turkmenistan; and Regulations for State Fish Protection Office of Turkmenistan of State Committee of Fisheries of Turkmenistan (FAO, 2009). The Presidential Decree #9541 of 26 February 2008 provided detailed descriptions of state policy and sustainable use as well as implementation of international legal documents (FAO, 2009).

The sturgeon fishery was reported to be a State monopoly (Raymakers, 2002a). Fisheries enforcement in the Caspian Sea was performed by Esenguly, Khazar, Bekdash and Marine inspection patrols (FAO, 2009). During spawning migrations in spring and autumn, the State Frontier Guard office and Ministry of Internal Affairs cooperated with other stakeholders and services to prevent poachers from gaining access to fishery resources (FAO, 2009).

Aquaculture of *H. huso* was reported to be underway in Kiyanly village of Balkan Velayat, Turkmenistan (Turkmenistan, 2009). Poaching was reported to be at least 10-13 times higher than the officially permitted fishing quota for sturgeons in the country (Turkmenistan, 2009). The regional Caspian commission on Aquatic Bioresources, together with CITES conducted work to identify fishing quotas and to "struggle against illegal sturgeon fishing" (Turkmenistan, 2009).

D. Problems identified that are not related to the implementation of Article IV, paragraphs 2 (a), 3 or 6 (a)

Uncontrolled poaching was reported to have caused widespread fishery collapses and to threaten remaining *H. huso* stocks with extirpation (Vecsei *et al.,* 2002). Illegal harvest and trade in sturgeon products have been identified by Caspian Basin range States as being among the most serious threats to a sustainable exploitation of the sturgeon stocks of the Caspian Sea (FAO, 2009). However, there are indications that the illegal trade in wild-sourced caviar may be declining due to demand being supplied by aquaculture operations (AC25 Doc. 16.1).

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Hippocampus kelloggi (Jordan & Snyder, 1901): People's Republic of China, India, Japan, Pakistan, the Philippines, Thailand, United Republic of Tanzania, Viet Nam

Syngnathidae, Great Seahorse, Kellog's Seahorse, Offshore Seahorse

Selection for Review of Significant Trade

Hippocampus kelloggi was selected for review at the 24th meeting of the Animals Committee on the basis of trade data provided in document AC23 Doc. 8.5, noting that in 2006 and 2007 trade amounted to many thousands (AC24 Summary Record). At the 25th Animals Committee meeting, the working group decided to exclude Australia, Indonesia and Malaysia, while retaining the People's Republic of China (hereafter referred to as China), India, Japan, Pakistan, Philippines, Thailand, United Republic of Tanzania (hereafter referred to as Tanzania) and Viet Nam in the Review of Significant Trade process, as they failed to report or provide sufficient information to a request of information from the CITES Secretariat, sent in July 2009 (AC25 Doc. 9.5).

A. Summary

Overview of *Hippocampus kelloggi* recommendations.

Range State	Provisional category	Summary
People's Republic of China	Least Concern	*Hippocampus kelloggi* appears to be the most commonly caught species, but populations were considered depleted due to overharvest and the species was categorised as nationally Endangered. International trade levels may represent thousands of specimens in some years. No wild-source trade was reported in 2010, and exports of wild *Hippocampus* spp. were prohibited in 2011. Therefore, on the basis of no anticipated trade, categorised as Least Concern. However, it is envisaged that trade would be permitted only in the event that substantial new information on the status of species was available.
India	Least Concern	Status poorly known but probably declining. Threatened by overexploitation through by-catch. Illegal trade has also been reported. However export of the species has been prohibited since 2001 and no international trade reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Japan	Least Concern	Status poorly known, though reported to be quite common in one area. However no international trade reported 2004-2011. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Pakistan	Least Concern	Status poorly known, although may be very rare. Export of the species is not permitted and no international trade reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Philippines	Least Concern	Status poorly known with reports of population declines. Illegal fishing was reported although harvest and trade in wild specimens is prohibited. No international trade reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.

Range State	Provisional category	Summary
Thailand	Urgent Concern	*H. kelloggi* was categorised as Vulnerable in the Thai Red Data Book and *Hippocampus* spp. was considered to be threatened by overfishing, particularly through bycatch. While the export of live *Hippocampus* spp. is not permitted, this does not appear to apply to dried specimens. International trade in wild specimens (bodies, reported in kg) was high 2004-2010, potentially representing several million specimens. The impact of trade is not known and available information indicates that exports are occurring without a scientifically based non-detriment finding, therefore categorised as Urgent Concern. In January 2012, as this report was going to press, the Thai Management Authority submitted additional information on population surveys and management of *Hippocampus* spp.. This information will be presented at the Animals Committee.
United Republic of Tanzania	Least Concern	Status poorly known, with no species specific information available, although declines in the genus were reported. However no international trade reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Viet Nam	Least Concern	*H. kelloggi* was reported to be abundant but declining. By-catch and localised overharvest were considered threats, and illegal trade also reported. Trade was moderate to high until 2006, with no reported trade in wild-sourced specimens since 2007. Viet Nam published a quota for 7000 captive-bred specimens in 2011, and confirmed that trade in wild specimens would not be permitted until a non-detriment finding had been made. Therefore, on the basis of no anticipated trade in wild specimens, categorised as Least Concern.

B. Species overview

Biology: *Hippocampus kelloggi* occurs in areas with soft bottom sea floor in depths over 20 m (Kuiter, 2000), where it prefers slopes with strong currents (Kuiter, 2009). It is associated with gorgonian corals and sea whips (Lourie *et al.*, 2004).

H. kelloggi is one of the largest *Hippocampus* species (Lourie *et al.*, 2004), with a maximum recorded adult height of about 28 cm (Kuiter, 2000; 2009) and a height at first maturity of 15 cm (Lourie *et al.*, 1999). Its life history is poorly known (Lourie *et al.*, 2004).

The sex ratio in *Hippocampus* spp. populations is equal (Lourie *et al.*, 1999) and animals are monogamous within a breeding cycle (Foster and Vincent, 2004). The reproductive rate of *Hippocampus* spp. is considered to be limited, due to the combination of small brood sizes and lengthy parental care (Lourie *et al.*, 1999).

Hippocampus spp. have small home ranges, low mobility and low natural adult mortality (Vincent, 1996). They were thought to live between 1-5 years (Vincent and Koldewey, 2006), but data on survival rates and other life history parameters was considered limited (Foster and Vincent, 2004).

Taxonomic note: Several taxonomic revisions of the genus *Hippocampus* have taken place, including revisions to *H. kelloggi* (Lourie *et al.*, 1999; 2004). All non-spiny *Hippocampus* used to be traded as *H. kuda*, prior to the isolation of *H. barbouri*, *H. borboniensis*, *H. comes*, *H. fisheri*, *H. fuscus* and *H. kelloggi* as distinct species (Lourie *et al.*, 2004). Lourie *et al.* (2004) considered *H. suezensis* to be a synonym, while Kuiter (2009) referred to specimens from Oman and Egypt as *H. suezensis* rather than *H. kelloggi*. DNA analysis of the Tanzanian

population of this species was reported to indicate that it may represent either a separate population or different species from the South-east Asian populations (S. Lourie *in litt.* to S. Foster, cited in S. Foster *in litt.* to UNEP-WCMC, 2011).

The identification of *H. kelloggi* was considered to be difficult, due to the species' variable and less-distinctive character, as well as morphological similarity to *H. algiricus*, *H. ingens*, *H. kuda* and *H. spinosissimus* (Lourie *et al.,* 2004).

General distribution and status: The species' range was believed to be relatively large (Project Seahorse, 2002), occurring in the Red Sea, Persian Gulf, Western Indian Ocean (including waters near southeast Africa, Madagascar and Reunion), Central Indian Ocean (near India and Sri Lanka), South China Sea, Philippine Sea, Java Sea, Celebes Sea to Banda Sea, possibly also including the eastern Indian Ocean, Coral Sea and Tasman Sea (including New Zealand) (Lourie *et al.,* 1999). Kuiter (2009; pers. comm. to UNEP-WCMC, 2011) considered the distribution of *H. kelloggi* to only range from sub-temperate to sub-tropical southern Japan over the South China Sea to the Philippines.

Data on *H. kelloggi* was considered to be extremely limited (Project Seahorse, 2002). The species was categorised as Data Deficient in the IUCN Red List (Project Seahorse, 2002) as, despite high demand for the species, the proportion of the population represented in trade was unknown.

Direct exploitation, by-catch and habitat destruction were considered to be major threats to *Hippocampus* spp. (Vincent, 1996; Project Seahorse, 2003). The majority of *Hippocampus* spp. was reported to be caught as by-catch during shrimp trawls (McPherson and Vincent, 2004; Giles *et al.,* 2006; Perry *et al.,* 2010). Pressures on particular populations or species used for the live aquarium trade were considered substantial (Vincent *et al.,* 2011).

The biological characteristics of *Hippocampus* spp. were considered likely to render them vulnerable to over-fishing and unsuitable for intense harvesting (Vincent, 1996; Foster and Vincent, 2004). These characteristics were also thought to explain the substantial declines in *Hippocampus* populations observed by fishermen and traders worldwide (Vincent, 1996). However, Curtis *et al.* (2007) found that demersal fishing may not reduce numbers in all *Hippocampus* species and Martin-Smith and Vincent (2005) also observed fisheries-independent declines.

A clear understanding of life history and ecology was considered essential for the management of *Hippocampus* spp. (Curtis *et al.,* 2007), with robust monitoring required to assess conservation actions (Martin-Smith and Vincent, 2005).

Overview of trade and management in the species: *H. kelloggi* was listed in CITES Appendix II on 15/05/2004. Trade from the selected range States 2004-2010 consisted primarily of bodies and live animals, the majority of which was wild-sourced; all trade was for commercial purposes. The main range States involved in trade were Thailand and Viet Nam. There was also trade recorded at the genus level (*Hippocampus* spp.), particularly by importers, including 8738 live specimens, 22 811 bodies, 1425 kg bodies, 28 998 derivatives and 133 kg derivatives.

In 2004, a voluntary minimum height limit of 10 cm for international trade in wild *Hippocampus* specimens was recommended by the Animals Committee at its 20th meeting (CITES Notification 2004/033; CITES Notification 2005/014). Concerns were raised that this would not sufficiently protect *H. kelloggi* from overexploitation, due to the height at maturity being more than 10 cm (Foster and Vincent, 2005). Curtis and Vincent (2008) recommended a precautionary minimum size limit of 14 cm, pending socioeconomic and management evaluation. No export or re-export permits are required for up to four dead specimens of

Hippocampus spp. per person for personal or household effects, as per CITES Resolution Conf. 13.7 (Rev. CoP 14).

Traditional (Chinese) medicine was estimated to consume 95 per cent of *Hippocampus* spp. in trade (Vincent *et al.,* 2011). The species is also traded as curios (dried) and live for aquarium and hobbyist use (Lourie *et al.,* 2004). The reasons for the high demand for *H. kelloggi* were believed to be the relatively large size, smooth texture and pale complexion of dried specimens (Lourie unpubl. data, Pajaro unpubl. data, cited in Project Seahorse, 2002).

Koldewey and Martin-Smith (2010) reported that demand for *Hippocampus* spp. could not yet be met though aquaculture, but considered *H. kelloggi* suitable for aquaculture. The majority of aquaculture facilities surveyed were reported to supply the live aquarium trade, with only two also providing specimens for traditional medicine and curios (Koldewey and Martin-Smith, 2010).

C. Country reviews

PEOPLE'S REPUBLIC OF CHINA

Distribution in range State: The species was reported to occur in the Gulf of Tonkin (Vincent, 1996), Guangdong, Fujian (X. Meng, *in litt.* to UNEP-WCMC, 2011) and in Taiwan POC (Tam Yee-wa, 2006; X. Meng, *in litt.* to UNEP-WCMC, 2011). Lee (1983) considered the species to be a synonym of *H. kuda* in Taiwanese waters.

Population trends and status: *H. kelloggi* was reported to be among the most frequently caught *Hippocampus* species along the coastal shores of China and Taiwan POC (Tam Yee-wa, 2006) and was reported to be the dominant species in the 0.1 t *Hippocampus* spp. caught annually in Guangxi province (X. Meng, *in litt.* to UNEP-WCMC, 2011). In Zhejiang province, the volume of the *Hippocampus* spp. population was estimated at between 0 and 2.29 tons in 2008, with *H. kelloggi* being the dominant species (X. Meng, *in litt.* to UNEP-WCMC, 2011).

The CITES Management Authority of China (X. Meng, *in litt.* to UNEP-WCMC, 2011) noted that *Hippocampus* spp. showed a scattered distribution and low population densities. Domestic sources of *Hippocampus* spp. were considered to be depleted (Vincent *et al.,* 2005).

H. kelloggi was categorised as Endangered in the Chinese Red Data Book (Wang and Xie, 2004). The species was considered to have been abundant in the past, but a gradual decline over the last 10 years [presumably 1995- 2004] were reported and expected to continue (Wang and Xie, 2004).

Threats: Demand for traditional medicine was reported to have depleted local supplies of *Hippocampus* spp. and as demand was not being met, smaller specimens were reported to be used, primarily for traditional medicine (Vincent, 1996). The levels of overfishing were considered to be of concern (Vincent, 1996) although the genus was reported to be obtained through by-catch rather than through a target fishery in China (X. Meng, *in litt.* to UNEP-WCMC, 2011; Vincent, 1996) and Taiwan POC (CoP12 Prop. 37). Habitat destruction through fishing methods used was also reported to threaten *Hippocampus* spp. in China (Vincent, 1996).

Trade: According to the CITES Trade Database, since the listing of *Hippocampus* spp. in the CITES Appendices in 2004, China reported the export of 71.6 kg of wild-sourced *H. kelloggi* bodies and derivatives, as well as captive-born bodies and captive-bred specimens, all for commercial purposes (Table 1). No additional exports were reported by Hong Kong SAR or Taiwan POC. Most specimens exported were reported to be of pre-Convention origin or to originate from by-catch (X. Meng, *in litt.* to UNEP-WCMC, 2011).

Table 1. Direct exports of *Hippocampus kelloggi* from China, 2004-2010 (with quantities rounded to the nearest tenth of a kg, where applicable). The species was listed in Appendix II on 15/05/2004.

Term	Units	Source	Reported by	2004	2005	2006	2007	2009	2010	Total
bodies	kg	W	Exporter	18.9				12.8		31.6
			Importer							
		F	Exporter					1.4		1.4
			Importer							
	-	I	Exporter							
			Importer			3861				3861
derivatives	kg	W	Exporter		13.6		26.3			40.0
			Importer							
		C	Exporter						5000	5000
			Importer							

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Indirect trade in *H. kelloggi* originating in China 2004-2010 consisted of the import of 30 kg of captive-bred bodies by the United States in 2008; this trade was not confirmed by the exporters. Annual reports have been received from China for all years 2004-2010.

National trade in *Hippocampus* spp. was thought to amount to at least 20 tonnes (five to six million specimens) annually in the mid 1990s (Vincent, 1996) and 7 tons in 2007 (X. Meng, *in litt.* to UNEP-WCMC, 2011). The CITES MA of China noted that higher volumes of *H. kelloggi* were being imported than exported (X. Meng, *in litt.* to UNEP-WCMC, 2011). Viet Nam was considered to be an important trading partner, although most of the trade between the two countries was considered to be illicit (Vincent, 1996).

Management: *Hippocampus* spp. is covered by the Chinese Wildlife Protection law (Category II) and permits are required for exploitation, breeding and trade (X. Meng, *in litt.* to UNEP-WCMC, 2011); however law enforcement was considered to be difficult in the early 2000s (Project Seahorse *in litt.* to UNEP-WCMC, 2011).

The export of wild *Hippocampus* spp. was banned on 01/01/2011 until further notice (J. He, pers. comm. to UNEP-WCMC, 2011), with the exception of small numbers for art collections (X. Meng, *in litt.* to UNEP-WCMC, 2011). The Fisheries Law of the People's Republic of China (1986, revised 2004) prohibits the use of means such as explosives, poison or electricity for fishing. *Hippocampus* spp. is included in Hong Kong SAR's Protection of Endangered Species of Animals and Plants Ordinance, Chapter 586 (Hong Kong, 2006). *Hippocampus* spp. is not included in the Schedule of Protected Species (Article 4) in Taiwan POC, however the use of means such as toxic substances, explosives or electricity for fishing are prohibited (Fisheries Act 1930, amended 2008).

China is working towards a reduction of by-catch, through measures such as the establishment of zones where fishing is banned (X. Meng, *in litt.* to UNEP-WCMC, 2011). In Taiwan POC, some major habitats were reported to be protected and inshore trawling is banned (CoP12 Prop. 37).

INDIA

Distribution in range State: The species' occurrence in India was reported from Kerala [southwest India] (Lourie *et al.,* 1999; Project Seahorse *in litt.* to UNEP-WCMC, 2011) and along the Coromandel Coast (Tamil Nadu) [southeast India] (Murugan *et al.,* 2008), including Madras [now Chennai] (Lourie *et al.,* 1999).

Population trends and status: *H. kelloggi* was considered to be abundant along the

Coromandel Coast, dominating the *Hippocampus* spp. by-catch (44 per cent, 9911 specimens annually) (Murugan *et al.*, 2008). Off the Tamil Nadu coast, the species represented 9 per cent of by-catch recorded (Murugan *et al.*, 2008). Overall *H. kelloggi* was considered to be less abundant than other species and was thought to require conservation action (Murugan *et al.*, 2008).

The absence of data on abundances and distributions of *Hippocampus* spp. in India was considered to limit the conservation and management of populations (Sreepada *et al.*, 2002). The genus was believed to be declining in India, based on analysis of by-catch (A. K. Srivastava, *in litt.* to UNEP-WCMC, 2011); half of the 160 fishers surveyed in India reported having observed decreases in *Hippocampus* spp. catches (A. Perry, unpublished data, cited in Project Seahorse, 2003).

Threats: The CITES Management Authority of India (A. K. Srivastava, *in litt.* to UNEP-WCMC, 2011) considered *Hippocampus* spp. to be threatened by illegal trade, by-catch and habitat degradation. On the southern Tamil Nadu coast [southwest India], *Hippocampus* spp. were considered to be under relatively high fishing pressure (Salin *et al.*, 2005).

Trade: According to data in the CITES Trade Database, no trade in *H. kelloggi* originating in India was reported between 2004 (when the species was listed in CITES Appendix II) and 2010. Annual reports from India have been received for all years except 2010.

Fishing and trade in *Hippocampus* spp. was thought to have been restricted to the southern states, Tamil Nadu and Kerala (Vincent, 1996). In 1995, annual exports of dried *Hippocampus* spp. from southern India were estimated at 3.6–6 tonnes (1.5-2.5 million specimens) (Vincent, 1996). In the early 2000s, India was considered one of the largest exporters of dried *Hippocampus* spp., contributing to about 30 per cent of the trade globally (Sreepada *et al.*, 2002), with Singapore, Hong Kong SAR, Malaysia and the United Arab Emirates as main trading partners (Salin *et al.*, 2005). In 2001, exports of dried specimens were estimated to be 9.75 tonnes, although official statistics recorded only 4.34 tonnes, suggesting a high proportion of undeclared trade (Salin *et al.*, 2005). The domestic market was considered negligible (Salin and Mohanakumaran, 2006). *H. kelloggi* was reported to fetch higher prices than other species, due to its larger size (Salin and Mohanakumaran, 2006).

Management: Syngnathids were listed on Schedule I of the Indian Wildlife Protection Act (A. K. Srivastava, *in litt.* to UNEP-WCMC, 2011) in 2001 (Notification S.O. 665(E)), effectively banning all trade in *Hippocampus* spp. (Chapter VA, Indian Wildlife Protection Act, 1972). While the implementation of the ban was found to have led to considerable declines in syngnathid fishing, directed exploitation was observed to have re-gained momentum in mid-2002 in some areas (Lipton and Thangaraj, 2002) and exports were reported to continue illegally (Murugan *et al.*, 2008; Vincent *et al.*, 2011). However, as trade in sygnathids was banned in India, no non-detriment findings or population assessments were being conducted (A. K. Srivastava, *in litt.* to UNEP-WCMC, 2011).

JAPAN

Distribution in range State: The species was reported to occur in southern Japanese waters (Kuiter, 2001) and it was reported from Hachijojima Island, Kochi [Shikoku Island], Kyushu Island (Kuiter, 2000), Yaku-shima Island (Motomura *et al.*, 2010), Kagoshima (Lourie *et al.*, 1999) and south of Izu Peninsula (H. Takahashi *in litt.* to UNEP-WCMC, 2011).

Population trends and status: The population status of *H. kelloggi* was considered to be poorly known (H. Takahashi *in litt.* to UNEP-WCMC, 2011; Project Seahorse *in litt.* to UNEP-WCMC, 2011). It was considered to be quite common in Kashiwajima [Kyushu Island,

southern Japan] (Kuiter, 2000; 2009) and it was not included in the Japanese Red List (Ministry of the Environment, undated).

Threats: No information on threats within Japan was located. The Japanese CITES Management Authority confirmed that *Hippocampus* spp. was not targeted by directed fishery with by-catch considered low (H. Takahashi *in litt.* to UNEP-WCMC, 2011).

Trade: According to data in the CITES Trade Database, no trade in *H. kelloggi* originating in Japan was reported 2004-2010. Annual reports from Japan have not yet been received for 2009 and 2010. Japan entered a reservation for this species in 2004.

Hippocampus spp. was reported to be used for traditional medicine and as aquarium fishes in Japan, with many specimens likely to be originating from imports (Vincent, 1996).

Management: The species is not subject to any population monitoring or management, and fisheries in general were reported to be under the control of Prefectural Governors (H. Takahashi *in litt.* to UNEP-WCMC, 2011). The species does not appear to be protected in Japan.

PAKISTAN

Distribution in range State: The occurrence of *H. kelloggi* in Pakistan was confirmed by the CITES Management Authority of Pakistan (S. Khan, *in litt.* to UNEP-WCMC, 2011); the species was reported to occur in "Kurachei" [Karachi] (Lourie *et al.,* 1999).

Population trends and status: Surveys in coastal waters undertaken since 1973 discovered only one specimen of *H. kelloggi* and the present and historic population was assumed to be very small (S. Khan, *in litt.* to UNEP-WCMC, 2011). Anecdotal information on *Hippocampus* spp. from the early 2000s was reported to indicate low historic abundances and population declines (Project Seahorse *in litt.* to UNEP-WCMC, 2011).

Threats: Habitat degradation and pollution were assumed to threaten seahorses within Pakistan; small numbers of *Hippocampus* spp. were reported to be taken in targeted fishery while specimens found in by-catch were discarded (Project Seahorse *in litt.* to UNEP-WCMC, 2011).

Trade: According to data in the CITES Trade Database, no trade originating in Pakistan was reported 2004-2010. Annual reports from Pakistan have not been received for 2009 and 2010.

Commercial exploitation was confirmed to be absent and no evidence of illegal trade had been found (S. Khan, *in litt.* to UNEP-WCMC, 2011). Low numbers of *Hippocampus* spp. were reported to be targeted for the national aquarium market (Project Seahorse *in litt.* to UNEP-WCMC, 2011).

Management: Export of the species is not permitted, as per Pakistan Fish Inspection and Quality Control Act, 1997 (S. Khan, *in litt.* to UNEP-WCMC, 2011).

The establishment of marine protected areas where *Hippocampus* spp. occur and research on their population status, particularly along Sindh and Balochistan coasts is required (S. Khan, *in litt.* to UNEP-WCMC, 2011).

PHILIPPINES

Distribution in range State: The species was reported to occur in the South China Sea (Lourie *et al.,* 1999; Randall and Lim, 2000) and near Jolo [island] (Lourie *et al.,* 1999).

Population trends and status: No information on trends and status of the species was located. Declines of 50-95 per cent in *Hippocampus* spp. were reported by fishers in the Philippines between 1980 and 1997 (Pajaro, unpublished data, cited in Project Seahorse,

2003).

Threats: *Hippocampus* spp. was considered to be vulnerable due to trade for traditional medicine, curios and aquaria (Vincent, 1996), with annual *Hippocampus* spp. by-catch in the Philippines estimated at 2-6 million specimens (Pajaro, unpubl. data, cited in Vincent *et al.,* 2011). Fishers in the Philippines attributed declining catches of *Hippocampus* spp. to overfishing, increasing population of fishers and indiscriminate harvest (including pregnant males and immature specimens) (Pajaro, unpublished data, cited in Project Seahorse, 2003). Habitat destruction was also considered a threat to *Hippocampus* spp. (Vincent, 1996).

Trade: According to data in the CITES Trade Database, no trade from the Philippines was reported 2004-2010. Annual reports from the Philippines have not been received for 2008 or 2010.

Prior to the listing of *Hippocampus* spp. in CITES Appendix II, the Philippines were considered a major exporter of seahorses (Project Seahorse *in litt.* to UNEP-WCMC, 2011). Three areas, Palawan (incl. Busuanga), the central Visayas (incl. Bohol, Cebu and Negros) and Mindanao (including Sulu and Tawi Tawi in the southern Philippines) were the main source of specimens in the mid 1990s (Vincent, 1996).

Management: Fishing, taking and trade of any species included in the CITES Appendices is prohibited in the Philippines, as per Section 97 of the Fisheries Code (Philippines, 1998; E. Alesna, pers. comm. to UNEP-WCMC, 2011). However, illegal fishing was reported to continue (O'Donnell *et al.,* 2010). The CITES Management Authority of the Philippines noted that no species-specific monitoring was being conducted (E. Alesna, pers. comm. to UNEP-WCMC, 2011).

A facility established in Handumon, central Philippines, was reported to be breeding *Hippocampus* spp. in captivity (Vincent, 1996).

THAILAND

Distribution in range State: The species' occurrence in Thailand was reported by Lourie *et al.* (1999); it occurs in the Andaman Sea and the Gulf of Thailand (the CITES Management Authority of Thailand, Y. Getpech, *in litt.* to UNEP-WCMC, 2011).

Population trends and status: *H. kelloggi* appeared to be the most commonly caught species in the Andaman Sea, with only very few specimens caught in the Gulf of Thailand (Y. Getpech, *in litt.* to UNEP-WCMC, 2011).

The species was categorised as Vulnerable in the Thailand Red Data Book 2005 (Vidthayanon, 2005) and the abundance of *Hippocampus* spp. was reported to have declined (Perry *et al.,* 2010).

Threats: *Hippocampus* spp. are threatened by habitat change, by-catch, invasive species and trade for traditional medicine (Y. Getpech, *in litt.* to UNEP-WCMC, 2011). Overfishing was considered to be the main cause of population declines (Vincent, 1996), with annual *Hippocampus* spp. by-catch reported to amount to 2.1 million specimens (Anon., 2001, cited in Perry *et al.,* 2010). Seahorse harvest was reported to be mostly from by-catch and the genus was not targeted directly (Y. Getpech, *in litt.* to UNEP-WCMC, 2011).

Trade: According to data in the CITES Trade Database, direct trade originating in Thailand since the listing of *Hippocampus* spp. in Appendix II in 2004 consisted exclusively of wild-sourced bodies traded for commercial purposes (Table 2). Re-exports of *H. kelloggi* originating in Thailand comprised wild-sourced animals traded for commercial purposes Annual reports have not yet been received from Thailand for 2010.

Table 2. Direct exports of *Hippocampus kelloggi* from Thailand, 2004-2010 (with quantities rounded to the nearest tenth of a kg, where applicable). All trade was in wild-sourced bodies. The species was listed in Appendix II on 15/05/2004. (No trade data was reported in 2010).

Term	Units	Reported by	2004	2005	2006	2007	2008	2009	Total
bodies	kg	Exporter	2375.2	3776.4	3497.8	3243.0	2998.3	2333.0	18223.6
		Importer	729.4	1981.4	1948.7	2130.1	2082.1	1714.3	10586.0
	-	Exporter							
		Importer			270				270

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Over 90 per cent of wild *Hippocampus* spp. in trade was reported to originate in Thailand (Nijman, 2010). *H. kelloggi* was reported to be mainly used for traditional medicine in Thai trade and was found to fetch much higher prices than other species (Perry *et al.*, 2010).

Management: The export of live *Hippocampus* spp. caught in Thai waters was reported to be prohibited since 1988 (Export and Import of Goods Act, B.E. 2522, 1979) (Y. Getpech, *in litt.* to UNEP-WCMC, 2011), but illegal exports were thought to have continued (Perry *et al.*, 2010). The following list of Notifications under the Thai Fishery Law was provided by the CITES MA of Thailand and was considered to be contributing to the management of *Hippocampus* spp. (Y. Getpech, *in litt.* to UNEP-WCMC, 2011):

- Notification B.E. 2515 *Re: Determination of Areas in which Fishing Appliances, i.e., Trawls and Push Nets used with Motor Vessels, are Prohibited*
- Notification B.E. 2522 *Re: Prohibition of Trawls and Push Nets in Fishing in Phang Nga Bay*
- Notification B.E. 2523 RE: *Using of Trawls and Push Nets with Motor Vessels in Fishing in Pang Nga Bay*
- Notification B.E. 2541 *Re: Prohibition of Push Nets used with Motor Vessel in Fishing in the Locality of Pattani Province*
- Notification B.E. 2542 *Re: Determining the Area in which Certain Kinds of Fishing Appliances are Prohibited in Fishing in Some Localities of Prachuab Kirikhan Province*
- Notification B.E. 2542 [sic]*Re: Determining the Area in which Beam Trawls are prohibited in Some Localities of Chonburi Province*

Consequently, the use of trawl- and push-nets within three kilometres of the Thai coast is prohibited (B.E.2515) as is the use of stationary gear within 400 m of the coastline (B.E.2515) (CHARM, 2005). However illegal fishing was found to occur (Y. Getpech, *in litt.* to UNEP-WCMC, 2011). Further measures include the establishment of conservation areas (e.g. 26 000 km^2 in the Gulf of Thailand and 1 800 km^2 in Phang Nga and Krabi) and protected areas (presently 73 479 km^2) (Y. Getpech, *in litt.* to UNEP-WCMC, 2011) as well as restrictions of fishing gear (B.E.2522, B.E. 2523, B.E. 2541 and B.E. 2542) (CHARM, 2005). The CITES MA of Thailand (Y. Getpech, *in litt.* to UNEP-WCMC, 2011) confirmed that the Fisheries Act B.E. 2490 (1985) prohibits the use of explosives, electricity and chemicals; fishing during the hatching season; and fishing in seagrass and coral reef areas.

Further management measures in Thailand were reported to include research into aquaculture aimed at a possible reduction of trade in wild specimens, release of specimens to celebrate important events and research into *Hippocampus* spp. genetics (Y. Getpech, *in litt.* to UNEP-WCMC, 2011). Research into the status of *Hippocampus* spp. fisheries was reported to be under way (Y. Getpech, *in litt.* to UNEP-WCMC, 2011).

UNITED REPUBLIC OF TANZANIA

Distribution in range State: The occurrence of *H. kelloggi* in Tanzania was reported by Lourie *et al.* (1999; 2004), where the species was found in the Zanzibar Archipelago and along the northern mainland coast, with reports from Bagamoyo and Ushongo (McPherson and Vincent, 2011).

Population trends and status: No information on trends and status of the species was located. As most fishermen and divers were reported to be unaware that several *Hippocampus* species exist, it was found to be impossible to gain species-specific abundance estimates (McPherson and Vincent, 2004).

Hippocampus spp. were considered to be rare off Dar es Salaam, Lindi [southern Tanzania] and most of Unguja [Zanzibar, island]; fairly common in northern Tanzania (Tanga, Kigombe, Pangani), Mtwara (southern Tanzania) and southern Pemba [island]; abundant in Bagamoyo [northern central Tanzania], the Rufiji Delta [central Tanzania], and Unguja's Menai Bay; and very abundant in most of northern Pemba, off Mkokotoni (north of Unguja) and in Mafia [island] (McPherson and Vincent, 2004).

Threats: *Hippocampus* spp. was considered to be threatened by overexploitation (McPherson and Vincent, 2004). The CITES Management Authority of Tanzania (*in litt.* to UNEP-WCMC, 2011) reported the species to be caught as bycatch in artisanal and commercial fisheries, and for seine and dynamite fishing to also affect the species.

Trade: According to data in the CITES Trade Database, no trade in *H. kelloggi* from Tanzania was reported 2004-2010. With the exception of 2007, all annual reports from Tanzania have been received for the period 2000-2010.

Trade in dried *Hippocampus* spp. from Tanzania was considered to be substantial in 2000, with reports of annual exports of at least 634-937 kg (about 254 000–339 000 specimens), although some specimens possibly originated in Mozambique (McPherson and Vincent, 2004). McPherson and Vincent (2004) did not encounter any trade in live specimens in Tanzania and reported that local use of *Hippocampus* spp. was very limited.

The CITES MA of Tanzania (*in litt*. to UNEP-WCMC, 2011) reported there to be no export trade for this species.

Management: *Hippocampus* spp. was reported to be predominantly obtained as by-catch and wild populations were therefore thought to require management beyond the regulation of export trade (McPherson and Vincent, 2004). The use of explosives and poison for fishing is not permitted (Tanzania Fisheries Act, 2003) and efforts to phase out destructive fishing techniques were thought to potentially benefit seahorses, although enforcement was considered poor (McPherson and Vincent, 2004). A number of Marine Protect Areas's were thought to contain *Hippocampus* spp. populations (McPherson and Vincent, 2004).

VIET NAM

Distribution in range State: The species was reported to occur in Quang Nam-Da Nang and the provinces Khanh Hoa and Binh Thuan (Lourie *et al.*, 1999). The Vietnamese CITES Management Authority (T.M. Vuong, *in litt.* to UNEP-WCMC, 2011) reported that the species' distribution ranged from Da Nang to Kien Giang Province.

Population trends and status: The CITES Management Authority of Viet Nam (T.M. Vuong, *in litt.* to UNEP-WCMC, 2011) considered *H. kelloggi* to be abundant, although the population was thought to be declining slightly. The species was included as Vulnerable in the list of endangered species published by the Ministry of Agriculture in Decision Number 82/2008/QD-BNN.

Giles *et al.* (2006) reported that landings of *Hippocampus* spp. showed geographic variations, with fewer caught in the north of Viet Nam than in the south, however it was unclear whether this was due to variations in abundance or the fishing method used. Observed landings of *Hippocampus* spp. by-catch of the Cua Be [central Viet Nam] fishing fleet between 1996 and 2000 consisted of 1 per cent *H. kelloggi* and *H. histrix* combined (Meeuwig *et al.*, 2006). The authors believed that this was likely to be due to the species occurrence in waters deeper than targeted by trawling, rather than to be reflecting the species abundance (Meeuwig *et al.*, 2006).

Population declines and reductions in the size of *Hippocampus* specimens in Viet Nam were inferred from data (Vincent, 1996) although the status of *Hippocampus* populations in Viet Nam was considered to be poorly known (Giles *et al.*, 2006).

H. kelloggi was not included in the Viet Nam Red Data Book (Institute for Science and Technology of Vietnam, 2007).

Threats: The CITES MA of Viet Nam (T.M. Vuong, *in litt.* to UNEP-WCMC, 2011) considered habitat destruction, pollution and climate change to be major threats to the species, with by-catch and localised overharvest also considered major threats.

The majority of *Hippocampus* spp. was thought to be sourced from trawl by-catch, which was estimated at about 6.5 tonnes (2.3 million specimens) annually over five coastal provinces (Bac Lieu, Kien Giang, Binh Thuan, Ca Mau and Khanh Hoa) (Giles *et al.*, 2006). Non-selective trawling was thought to pose a greater threat to *Hippocampus* spp. in Viet Nam than trade (Giles *et al.*, 2006), while Vincent (1996) had previously considered habitat destruction a possibly greater threat than trade.

Trade: According to data in the CITES Trade Database, direct exports of *H. kelloggi* reported by Viet Nam since the listing of *Hippocampus* spp. in Appendix II in 2004 consisted of wild-sourced live specimens and bodies for commercial purposes (Table 3). No trade in wild-sourced specimens has been recorded since 2007. Very low level re-exports were reported. Annual reports from Viet Nam have been received for all years 2000-2010.

Viet Nam published an export quota for 7000 live *H. kelloggi* in 2011. Although not specified on the CITES website (as of 24 November, 2011), the CITES MA of Viet Nam noted that the quota only applied to captive bred specimens (T.M. Vuong, pers. comm. to UNEP-WCMC, 2011).

Table 3. Direct exports of *Hippocampus kelloggi* from Viet Nam, 2004-2010. The species was listed in Appendix II on 15/05/2004. (No trade was reported in 2004).

Term	Source	Reported by	2005	2006	2007	2009	2010	Total
Live	W	Exporter	12124	350				12474
		Importer	9677	3322	200			13199
	F	Exporter						
		Importer				150	100	250
bodies	W	Exporter	1860					1860
		Importer						

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Viet Nam was reported to be one of the top five producers of dried *Hippocampus* spp. (Project Seahorse, unpubl. data, cited in Giles *et al.*, 2006). While internal trade in "seahorse tonic" was reported to exist (CoP12 Prop. 37), the majority of specimens were reported to be exported to China, "generally through unofficial and unregulated channels" (Giles *et al.*, 2006). However, information on the nature and size of the trade was considered insufficient

(Giles *et al.*, 2006).

The CITES MA of Viet Nam noted that there had been no exports of wild *H. kelloggi* since 350 specimens were exported in 2006, although they noted that illegal trade was an issue (T.M. Vuong, *in litt.* to UNEP-WCMC, 2011).

Management: The CITES MA of Viet Nam (T.M. Vuong, *in litt.* to UNEP-WCMC, 2011) noted that non-detriment findings had not been conducted, but there was a need for such assessments to be done within the next five years, in case exports of wild specimens were allowed. They noted that the species is successfully bred in captivity and legally sourced from captive breeding facilities in Viet Nam (T.M. Vuong, *in litt.* to UNEP-WCMC, 2011), with breeding farms considered to be in line with Conf. Res. 10.16 (T. M. Vuong, pers. comm. to CITES Secretariat, 2011); export of seahorses taken from the wild is not permitted until non-detriment findings have been conducted (T.M. Vuong, pers. comm. to UNEP-WCMC, 2011).

No species specific monitoring program was in place except those on the monitoring of biodiversity in general (T.M. Vuong, *in litt.* to UNEP-WCMC, 2011).

Harvest of *Hippocampus* spp. within the core zones of the five Marine Protected Areas was reported to be prohibited, with plans to increase the number of MPA's existing (T.M. Vuong, *in litt.* to UNEP-WCMC, 2011). The species was reported be covered within the following legislation (T.M. Vuong, *in litt.* to UNEP-WCMC, 2011):

- Government Decree No 82/2006/ND-CP of August 10, 2006: *Management of export, import, re-export and introduction from the sea, transit, breeding*
- Circular No 59/2010/TT-BNNPTNT of October 19, 2010: *Ministry of Agriculture and Rural Development (MARD) on Promulgating Lists of wild animals and plants under CITES management*

Giles *et al.* (2006) believed that regulation of international trade would have little impact on reducing seahorse by-catch or domestic trade in Viet Nam.

Captive-bred specimens of *H. kelloggi* were reported to have been released in Hon Mun Marine Protected Area for the conservation of the species (T.M. Vuong, *in litt.* to UNEP-WCMC, 2011).

D. Problems identified that are not related to the implementation of Article IV, paragraphs 2 (a), 3 or 6 (a)

By-catch was reported as a main threat. Illegal trade was reported to be occurring in People's Republic of China, India, the Philippines, Thailand and Viet Nam. Trade in *Hippocampus* spp. has been reported at the genus level, making the monitoring of trade in individual species difficult. Furthermore, the mixed reporting of units (specimens and weight (kg)) makes it difficult to estimate the total number of specimens in international trade.

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***Hippocampus kuda* Bleeker, 1852: Australia, Cambodia, People's Republic of China, Egypt, Fiji, French Polynesia, India, Japan, Kenya, Madagascar, the Maldives, Mauritius, Federated States of Micronesia, Mozambique, Pakistan, Palau, Papua New Guinea, Philippines, Republic of Korea, Samoa, Singapore, Solomon Islands, Thailand, Tonga, Viet Nam.**

Syngnathidae, Black Seahorse, Coloured Seahorse, Oceanic Seahorse, Spotted Seahorse, Yellow Seahorse.

Selection for Review of Significant Trade

Hippocampus kuda was selected for review at the 24th meeting of the Animals Committee on the basis of trade data provided in document AC23 Doc. 8.5, noting that in 2006 and 2007 trade amounted to many thousands (AC24 Summary Record). At the 25th Animals Committee meeting, the working group decided to exclude Indonesia, Malaysia, New Caledonia (France) and the United States of America while retaining Australia, Cambodia, the People's Republic of China (hereafter referred to as China), Egypt, Fiji, French Polynesia (France), India, Japan, Kenya, Madagascar, the Maldives, Mauritius, the Federated States of Micronesia, Mozambique, Pakistan, Palau, Papua New Guinea and the Philippines in the Review of Significant Trade process, as they failed to report or provide sufficient information to a request of information from the CITES Secretariat, sent in July 2009 (AC25 Doc. 9.5).

A. Summary

Overview of *Hippocampus kuda* recommendations.

Range State	Provisional category	Summary
Australia	Least Concern	Limited information was available on the status of *H. kuda* in Australia, and taxonomic uncertainties remain. International trade from Australia 2004-2010 was entirely of captive-bred specimens. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Cambodia	Least Concern	The status of the species is unknown with much of the available information at the genus level, indicating population declines. The genus was reported to be targeted by direct fishery and caught as bycatch, and illegal trade was also reported. However, *Hippocampus* spp. appears to be protected and no international trade in *H. kuda* was reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
People's Republic of China	Least Concern	While *H. kuda* was considered to have been abundant in the past, declines reported and categorised as nationally Endangered. The species was considered to be threatened by overfishing. Relatively high international trade levels 2004-2010, representing hundreds of thousands of wild specimens. However, exports of wild *Hippocampus* spp. were prohibited in 2011. Therefore, on the basis of no anticipated trade, categorised as Least Concern. However, it is envisaged that trade would be permitted only in the event that substantial new information on the status of species was available.
Egypt	Least Concern	Specimens previously identified as *H. kuda* were later confirmed to be *H. fuscus* and Egypt was therefore not considered to be a range State for *H. kuda*. No international trade reported 2004-2010. Therefore, on the basis of unlikely occurrence in Egypt and no anticipated trade, categorised as Least Concern.

Range State	Provisional category	Summary
Fiji	Least Concern	Status poorly known, however, harvest and trade are regulated and no international trade reported 2004-2010. On the basis of no anticipated trade, categorised as Least Concern.
French Polynesia (France)	Least Concern	Occurrence in French Polynesia uncertain, with some authors considering previous reports of *H. kuda* to represent misidentified *H. histrix*. No international trade reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
India	Least Concern	Status poorly known, but declines reported. It is considered threatened by overexploitation through by-catch and illegal trade. However export of the species has been prohibited since 2001 and no international trade reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Japan	Least Concern	Status poorly known. By-catch levels were considered to be low and the species is not targeted directly. However no international trade reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Kenya	Least Concern	Specimens from Kenya were considered to represent *H. fuscus* and Kenya was therefore not considered to be a range State for *H. kuda.* No international trade reported 2004-2010. Therefore, on the basis of unlikely occurrence in Kenya and no anticipated trade, categorised as Least Concern.
Madagascar	Least Concern	Specimens from Madagascar were considered to represent *H. borboniensis* or *H. fuscus* and Madagascar was therefore not considered to be a range State for *H. kuda.* No international trade reported 2004-2010. Therefore, on the basis of unlikely occurrence in Madagascar and no anticipated trade, categorised as Least Concern.
Maldives	Least Concern	Population status not known. However, no international trade reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Mauritius	Least Concern	Specimens from Mauritius were considered to represent *H. borboniensis* or *H. fuscus* and Mauritius was therefore not considered to be a range State for *H. kuda.* No international trade reported since 2004. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Micronesia (Federated States of)	Least Concern	Population status not known. However, no international trade reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Mozambique	Least Concern	Specimens from Mozambique were considered to represent *H. borboniensis* or *H. fuscus* and Mozambique was therefore not considered to be a range State for *H. kuda.* No international trade reported 2004-2010. Therefore, on the basis of unlikely occurrence in Mozambique and no anticipated trade, categorised as Least Concern.
Pakistan	Least Concern	Status poorly known, although population may be very small. Export of the species is not permitted and no international trade reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Palau	Least Concern	Population status not known. However, no international trade reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Papua New Guinea	Least Concern	Status not known, *but H. kuda* is locally the dominant *Hippocampus* species. However, no international trade reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.

Range State	Provisional category	Summary
Philippines	Least Concern	Status poorly known with reports of population declines. Illegal fishing was reported although harvest and trade in wild specimens is prohibited. No international trade reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Republic of Korea	Least Concern	Status not known. However, no international trade reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Samoa	Least Concern	Status not known. However, no international trade reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Singapore	Least Concern	Uncommon and categorised nationally as Vulnerable. Harvest and trade is prohibited without permits and no permits for commercial harvest are issued. Illegal trade in *Hippocampus* spp. was also reported. Low levels of international trade 2004-2005, with no trade since then. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Solomon Islands	Least Concern	Status not known. However virtually no international trade reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Thailand	Urgent Concern	*H. kuda* was categorised as Vulnerable in the Thai Red Data Book and *Hippocampus* spp. was considered to be threatened by overfishing, particularly through bycatch. While the export of live *Hippocampus* spp. is not permitted, this does not appear to apply to dried specimens. International trade in wild specimens (bodies, reported in kg) was moderate 2004-2009, potentially representing hundreds of thousands of specimens. The impact of trade is unknown, and available information indicates that exports are occurring without a scientifically based non-detriment finding, therefore categorised as Urgent Concern. In January 2012, as this report was going to press, the Thai Management Authority submitted additional information on population surveys and management of *Hippocampus* spp.. This information will be presented at the Animals Committee.
Tonga	Least Concern	Status not known. Virtually no international trade reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Viet Nam	Possible Concern	Nationally Endangered with declines reported. By-catch and localised overharvest were considered threats, and illegal trade also reported. High levels of international trade 2004-2010. Viet Nam published a quota of 77 000 captive-bred specimens in 2011. While Viet Nam confirmed that trade in wild specimens would not be permitted until a non-detriment finding had been made, low level trade in wild specimens was reported in 2009 and 2010, therefore categorised as Possible Concern.

B. Species overview

Biology: *Hippocampus kuda* occurs in coastal bays and lagoons, containing seagrass, floating weeds (Kuiter and Debelius, 1994, cited in Lourie *et al.*, 2004), macroalgae (*Caulerpa* sp.) and eelgrass (*Enhalus acroroides*) (Choo and Liew, 2003), on sandy and muddy sea floors (Lee, 1983; Nguyen and Do, 1996, cited in Lourie *et al.*, 2004). The species can tolerate brackish water and is found in estuaries, lower reaches of rivers and harbours (Kuiter, 2000). *H. kuda* also uses artificial habitats, such as fishnets and cages (Choo and Liew, 2003). The species has been recorded in depths of up to 50 m (Lourie *et al.*, 1999a) but is most

commonly found in depths of up to 8 m (Lourie, 2001).

Reports of the species' maximum size varied between 15 cm (Kuiter, 2000) and 20.2 cm (Murugan *et al.,* 2011). Sexual maturity is reached at seven to eight months (Lourie *et al.,*1999a), at a size of between eight and 14 cm (S. Job pers. comm., cited in Jones, 2005; Jiaxin, 1990). The breeding season is year round and *H. kuda* may breed repeatedly each year (Jones, 2005). The maximum brood size reported is 1751 young (Okuzawa *et al.,* 2008), with the maximum annual reproductive output estimated at over 29 000 young (Foster and Vincent, 2004). However, the reproductive rates of *Hippocampus* spp. were considered to be limited, due to the combination of small brood sizes and lengthy parental care (Lourie *et al.,* 1999a).

H. kuda specimens have been held in aquaria for more than two years, however life expectancy is not yet known (Jones, 2005).

Taxonomic note: Several taxonomic revisions of the genus *Hippocampus* have taken place, including revisions to *H. kuda*, (Lourie *et al.*, 1999; 2004). All non-spiny *Hippocampus* specimens used to be traded under the name *H. kuda*, prior to the isolation of *H. barbouri, H. borboniensis, H. comes, H. fisheri, H. fuscus* and *H. kelloggi* as distinct species (Lourie *et al.,* 2004). *H. kuda* was nevertheless considered a species complex with unresolved taxonomy (Koldewey and Martin-Smith, 2010) and further research into the relationships among the species involved was considered to be required (Lourie *et al.,* 2004; Scales, 2010). Vincent *et al.* (2011) noted the likelihood of species misidentification in trade.

General distribution and status: The distribution of *H. kuda* was reported to range from the Central Indian Ocean (near India and Sri Lanka), eastern Indian Ocean, Coral Sea, Tasman Sea (including New Zealand), Banda Sea, Java Sea, Celebes Sea, South China Sea, Philippine Sea, to the Central Pacific (Lourie *et al.,* 1999a). However, the use of the name *H. kuda* for a wide range of smooth species was thought to have led to the perception of a wide distribution, although most *Hippocampus* spp. were considered to be highly localised (Kuiter, 2001).

Global population numbers for the species were considered to be unknown (Project Seahorse, 2003). The discontinuous distribution of suitable habitat was considered to be a barrier to dispersal for *H. kuda* (Lourie *et al.,* 2005).

H. kuda was categorised as Vulnerable in the IUCN Red List, on the basis of "inferred declines of at least 30 per cent caused by targeted catch, incidental capture, and habitat degradation" (Project Seahorse, 2003).

Direct exploitation, by-catch and habitat destruction were considered to be major threats to *Hippocampus* spp. (Vincent, 1996; Project Seahorse, 2003). Furthermore, pressures on particular populations or species used for the live aquarium trade were considered substantial (Vincent *et al.,* 2011).

The biological characteristics of *Hippocampus* spp. were considered likely to render them vulnerable to over-fishing and unsuitable for intense harvesting (Vincent, 1996; Foster and Vincent, 2004). These characteristics were also thought to explain the substantial declines in *Hippocampus* populations observed by fishermen and traders worldwide (Vincent, 1996), although Curtis *et al.* (2007) found that demersal fishing may not reduce numbers in all *Hippocampus* species and Martin-Smith and Vincent (2005) also observed fisheries-independent declines.

Little information was available on changes in numbers of *H. kuda* and the proportion of the population harvested for trade, but indirect evidence was thought to point at past and continuing declines (Project Seahorse, 2003).

A clear understanding of life history and ecology was considered essential for the management of *Hippocampus* spp. (Curtis *et al.,* 2007), with robust monitoring required to assess conservation actions (Martin-Smith and Vincent, 2005).

Overview of trade and management: *H. kuda* was listed in CITES Appendix II on 15/05/2004. International trade 2004-2010 consisted primarily of live animals and bodies, with smaller quantities of specimens and derivatives also reported. Trade was principally wild-sourced and captive-born. The vast majority of trade was for commercial purposes, and the main range State involved in trade was Viet Nam. There was also trade recorded at the genus level (*Hippocampus* spp.), particularly by importers, including 8738 live specimens, 22 811 bodies, 1425 kg bodies, 28 998 derivatives and 133 kg derivatives.

A voluntary minimum height limit of 10 cm for international trade in wild *Hippocampus* specimens was recommended by the Animals Committee at its 20th meeting (CITES Notification 2004/033; CITES Notification 2005/014). Curtis and Vincent (2008) recommended a precautionary minimum size limit of 14 cm, pending socioeconomic and management evaluation. No export or re-export permits are required for up to four dead specimens of *Hippocampus* spp. per person for personal or household effects, as per CITES Resolution Conf 13.7. (Rev. CoP 14).

H. kuda was considered valuable for traditional medicine purposes, curios and aquaria (Perry *et al.,* 2010). Actual global trade in *Hippocampus* spp. was thought to be significantly higher than the legal trade reported (Nijman, 2010; Vincent *et al.,* 2011).

Koldewey and Martin-Smith (2010) reported that demand for *Hippocampus* spp. could not yet be met though aquaculture, but noted that *H. kuda* was among the seven species accounting for more than 99 per cent of international trade in live captive-bred specimens (Koldewey and Martin-Smith, 2010). Survival of *H. kuda* to maturity in captive breeding operations was reported to range between 30-70 per cent (Koldewey and Martin-Smith, 2010); the rearing of young to adulthood and until they reproduce was considered difficult (Lourie *et al.,* 1999a).

C. Country reviews

AUSTRALIA

Distribution in range State: The species distribution ranges across the northern waters, from the Northwest Cape to the North Coast of New South Wales and including Christmas Island (The Australian CITES Scientific Authority for Marine Species, *in litt.* to UNEP-WCMC, 2011). The species was reported to occur in Cairns, Cooktown, Daintree, Gulf of Carpentaria, Lizard island, Moreton Bay, Noosa Heads, Russell River, Southport, Swain Reefs, Torres Strait, Townsville, [Queensland], Dampier Archipelago and Monte Bello Islands, [Western Australia] (Lourie *et al.,* 1999a).

The Australian *H. kuda* specimens were thought possibly to be distinct from *H. kuda*, but further research was required to determine the taxonomy (Casey, S. undated, *in litt.* to Lourie *et al.,* 1999a). Martin-Smith and Vincent (2006) noted taxonomic uncertainties with *H. kuda* from Australia. Kuiter (2001) considered *H. kuda* to only range from the Andaman Sea to southern Japan, with records east of the Wallace's Line representing *H. taeniopterus*, which he reported to occur in Queensland and the Northern Territory; Lourie *et al.* (2004) however considered *H. taeniopterus* a synonym of *H. kuda.*

Population trends and status: Australian populations were thought to provide a refuge for *H. kuda*, as levels of exploitation, including trawl by-catch, off northern Australia were considered to be low (Martin-Smith and Vincent, 2006). Limited information was reported to be available on the status of the species within Australia (CITES MA and SA of Australia,

2011).

The species was not included in the list of threatened species within the Australian Environment Protection and Biodiversity Conservation Act (DSEWPC, 2009).

Threats: By-catch, habitat alteration and loss, harvest for marine aquarium trade and traditional medicine are potential localised threats to the species (The CITES MA and SA of Australia, 2011). International trade was not considered to be a major threat in Australia, as the number of *Hippocampus* spp. caught in target fishery or as by-catch was not considered to be large; habitat degradation and loss were reported to be the greatest threat to Syngnathids in Australia (Martin-Smith and Vincent, 2006).

Trade: According to data provided by the CITES MA and SA of Australia (2011), exports of *H. kuda* between 2004 and 2011 comprised 7 312 live specimens and 50 bodies, all captive-bred (Table 1). Exports increased between 2008 and 2011.

Table 1. Direct exports of *H. kuda* specimens 2004-2011, as reported by the Management and Scientific Authorities of Australia. All trade was reported as captive-bred and for commercial purposes.

Term	2004	2005	2006	2007	2008	2009	2010	2011	Total
live	30	100	46	676	306	911	3707	*1536	7312
bodies							50		50

*Up until April 2011
(Source: CITES MA & SA of Australia, 2011)

Trade recorded within the CITES Trade Database over the period 2004-2010 (Table 2) is largely consistent with the trade information provided by the Management and Scientific Authorities of Australia; however, as annual reports have not yet been received, data for 2010 and 2011 are not yet included within the CITES Trade Database.

Reported re-exports of *H. kuda* originating in Australia between 2004 and 2010 consisted exclusively of captive-bred, live specimens traded for commercial purposes.

Table 2. Direct exports of *Hippocampus kuda* from Australia, 2004-2010. All trade was in live specimens. The species was listed in Appendix II on 15/05/2004.

Source	Purpose	Reported by	2004	2005	2006	2007	2008	2009	2010	Total
W	S	Exporter								
		Importer						15		15
C	T	Exporter	30	100	46	676	276	911		2039
		Importer		50	20	169	30	764	30	1063
	Z	Exporter								
		Importer				18				18

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

In the mid 2000s, the *Hippocampus* spp. fishery and aquaculture were considered to be of limited economic importance in Australia (Martin-Smith and Vincent, 2006).

Live specimens of the species were found to be offered for sale within Australia, either originating from other countries or from Australian captive breeding operations (Martin-Smith and Vincent, 2006). Domestic trade levels in *Hippocampus* spp. were estimated at 9-350x10^3 kg dried specimens and 3.7-29.6x10^3 kg live specimens per year (Martin-Smith and Vincent, 2006).

Management: *H. kuda* was included in the Environment Protection and Biodiversity Conservation Act 1999 as a protected species, therefore prohibiting the killing, injuring, taking, trading, keeping or moving of the species without a permit (CITES MA and SA of Australia, 2011). State legislation applies in State waters, when the species is harvested for

domestic use (CITES MA and SA of Australia, 2011).

Syngnathids were reported to have a high conservation profile in Australia, with *ex situ* research and culturing being undertaken in a number of commercial facilities (Martin-Smith and Vincent, 2006). All exports of *H. kuda* from Australia since its listing in CITES Appendix II were reported to be sourced from one captive breeding facility, based in Tasmania and approved under the EPBC Act and Regulations (reflecting the CITES definition for captive-bred specimens) (CITES MA and SA of Australia, 2011). A reassessment is due in December 2011 (CITES MA and SA of Australia, 2011). The approval was reported to require the establishment of parental stock without detrimental effect on the wild population and management ensuring long-term genetic viability, with none or little additional wild stock required to be added (CITES MA and SA of Australia, 2011).

The CITES MA and SA of Australia (2011) noted that the species was not being harvested from the wild by any of the Marine Aquarium Fisheries in Western Australia, northern Territory or Queensland.

CAMBODIA

Distribution in range State: The species was reported to occur in Kampong Saom [province in southern Cambodia] (Lourie *et al.,* 2005), near the border with Viet Nam (Giles *et al.,* 2006) and Koh Rong Samloem island (MCC, 2011c).

Population trends and status: *Hippocampus* spp. numbers were reported to have declined drastically and although considered abundant in the past, some of the seven species previously recorded in Cambodia have not been recorded recently (MCC, 2011a).

Threats: Targeted *Hippocampus* spp. fishing, large-scale by-catch and habitat destruction were considered threats in Cambodia (MCC, 2011a), with cyanide or dynamite fishing and by-catch listed as further threats to marine life (MCC, 2011b). Substantial declines in *Hippocampus* spp. observed in Koh Rong Samloem were attributed to trawling activities (MCC, 2011c).

Trade: According to data in the CITES Trade Database, no trade from Cambodia was reported 2004-2010. Annual reports have not yet been received from Cambodia for 2009 or 2010.

The majority of illegal trade in seahorses was reported to take place in Kep market, with subsequent transport to Viet Nam (MCC, 2011a).

Management: Capture, killing or trade of *Hippocampus* spp. was reported to be prohibited (Project Seahorse *in litt.* to UNEP-WCMC, 2011). *Hippocampus* spp. was reported to be classified as endangered within a sub-decree of the Royal Government of Cambodia (Atkins *et al*., 2010).

Trawling between the shore and waters of 20 m depth is not permitted, nor is the use of explosives, electricity and other "modern fishing gears not yet mentioned in the Proclamation of the Ministry of Agriculture" (Fisheries Management and Administration Fiat Lay No. 33 KRO.CHOR, 1987).

Although two conservation areas established around Koh Rong Samloem and Koh Rong were expected to be important for the conservation of *Hippocampus* spp., conservation and management plans were considered to be urgently needed (MCC, 2011a).

PEOPLE'S REPUBLIC OF CHINA

Distribution in range State: The species was reported to occur in the South China Sea (X. Meng, *in litt.* to UNEP-WCMC, 2011), the Gulf of Tonkin (Nguyen, 1993; Lourie *et al.,*

1999b), in Hong Kong SAR and Taiwan POC (Lourie *et al.*, 1999a), where it was reported from Chengkong [Chenggong] in Taitung County (Lee, 1983) and Ta Pong Bay [both south-western Taiwan POC] (Lourie *et al.*, 2005).

Population trends and status: The CITES Management Authority of China (X. Meng, *in litt.* to UNEP-WCMC, 2011) noted that *Hippocampus* spp. showed a scattered distribution and low population densities. In Zhejiang province, the *Hippocampus* spp. population was estimated at between 0 and 2.29 tons in 2008, with *H. kelloggi* considered the dominant species (X. Meng, *in litt.* to UNEP-WCMC, 2011). Domestic sources of *Hippocampus* spp. were considered to be depleted (Vincent *et al.*, 2005) and *H. kuda* was categorised as Endangered in the Chinese Red Data Book (Wang and Xie, 2004). The species was thought to have been abundant in the past, but a gradual declines over the last 10 years [presumably 1995- 2004] were reported and expected to continue (Wang and Xie, 2004).

Threats: Demand for traditional medicine was reported to have depleted local supplies of *Hippocampus* spp. and, as demand was not being met, smaller specimens were reported to be used, primarily for traditional medicine (Vincent, 1996). Overfishing was considered to threaten *H. kuda* and pressure on wild populations was expected to increase (Wang and Xie, 2004) although the genus was reported to be obtained through by-catch rather than through a target fishery in China (X. Meng, *in litt.* to UNEP-WCMC, 2011; Vincent, 1996) and Taiwan POC (CoP12 Prop. 37). Habitat destruction was also considered a threat to the species (Wang and Xie, 2004).

Trade: According to data in the CITES Trade Database, direct exports reported by China 2004-2010, consisted primarily of wild-sourced bodies and derivatives traded for commercial purposes (Table 3). Annual reports from China have been received for all years over this period. In addition, Hong Kong SAR reported the direct export of 30 live, captive-bred specimens of *H. kuda* for zoological purposes in 2005.

Table 3. Direct exports of *Hippocampus kuda* from China, 2004-2010 (with quantities rounded to the nearest tenth of a kg, where applicable). The species was listed in Appendix II on 15/05/2004.

Source	Term	Units	Reported by	2004	2005	2006	2007	2008	2009	2010	Total
W	bodies	kg	Exporter	50.0		611.6			17.3	56.5	735.4
			Importer								
		-	Exporter			1000					1000
			Importer					3160			3160
	derivatives	kg	Exporter		327.2		513.3	210.1			1050.6
			Importer								
		-	Exporter					1900		2000	3900
			Importer					1200			1200
C	derivatives	kg	Exporter								
			Importer		0.3						0.3

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

All indirect exports of *H. kuda* originating in China were re-exported over the period 2005-2010 via Hong Kong SAR, primarily to the United States.

Domestic trade in *Hippocampus* spp. in the mid 1990s was thought to amount to at least 20 tonnes (five to six million specimens) annually (Vincent, 1996), and 7 tons in 2007 (X. Meng, *in litt.* to UNEP-WCMC, 2011). Annual harvests of 20 tonnes *Hippocampus* spp. were reported to be taken in three provinces (CoP12 Prop. 37). The CITES MA of China noted that higher volumes of *H. kuda* were being exported than imported (X. Meng, *in litt.* to UNEP-

WCMC, 2011).

Management: The export of wild *Hippocampus* spp. was banned on 01/01/2011 until further notice (J. He, pers. comm. to UNEP-WCMC, 2011), with the exception of small numbers for art collections (X. Meng, *in litt.* to UNEP-WCMC, 2011).

Further information on legislation and other management measures, as provided by the China Management Authority (X. Meng, *in litt.* to UNEP-WCMC, 2011), can be found in the review of *H. kelloggi*.

H. kuda was reported to have been bred in three operations in China in 2000 (Koldewey and Martin-Smith, 2010).

EGYPT

Distribution in range State: Occurrence in Egypt reported, although noted to be questionable (Myers, 1991, cited in FishBase, 2010). However, specimens previously identified as *H. kuda* were confirmed to be *H. fuscus* and Egypt was therefore not considered to be a range State for *H. kuda* (Lourie *et al.,* 2004; Lourie, 2011).

Population trends and status: No information was located.

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade in *H. kuda* was reported for Egypt 2004-2010. Prior to the species' listing in 2004, the import of a total of 245 live wild-sourced specimens from Egypt was reported by Germany, Italy and Spain between 2000 and 2002. Annual reports have not yet been received from Egypt for 2005, 2008, 2009 or 2010.

Management: No information was located.

FIJI

Distribution in range State: Occurrence in Fiji confirmed by Lourie *et al.* (1999a; 2004), where the species was reported from Suva.

Population trends and status: The *H. kuda* population in Fiji showed a low genetic diversity, possibly indicating that the region was colonised recently. No further information on population status was located.

Threats: The species was noted to be rarely, if at all, used for the local aquaculture industry, but was not considered to be used for commercial purposes within Fiji (Nair, 2003).

Trade: According to data in the CITES Trade Database, no trade from Fiji was reported 2004-2010. Annual reports from Fiji for 2009 and 2010 have not been received.

"A few" *Hippocampus* spp. specimens were reported to have been seen for sale in Fiji as curio (Vincent, 1996), but no further reports of trade were found (Ganiga, 2006).

Management: The use of explosives and poison for fishing is banned in Fiji and the export of live fish, unless sourced from licensed aquaculture facilities, is not permitted (Fisheries Act, Chapter 158). *H. kuda* was listed on Schedule 2 of the Endangered and Protected Species Act 2002, requiring permits for trade and introduction from the sea.

FRENCH POLYNESIA (FRANCE)

Distribution in range State: Occurrence in Tahiti, French Polynesia reported by Lourie *et al.* (1999a) and confirmed by Lourie *et al.* 2004). However, the CITES Management Authority of France (S. Guillaume, *in litt.* to UNEP-WCMC, 2011) noted that reports of the species within French Polynesia were considered to represent misidentified *H. histrix* specimens, based on Bacchet *et al.* (2006), Randall (2005) and Brooks (pers. comm. to CITES

Management Authority of France, 2011). French Polynesia was therefore not considered to be part of the distribution range of *H. kuda* (S. Guillaume, *in litt*. to UNEP-WCMC, 2011).

Population trends and status: No information was located.

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade from French Polynesia was reported 2004-2010. French Polynesia is a dependent territory of France; all annual reports 2004-2010 have been received from France. *Hippocampus* spp. is not protected within French Polynesia (Code de l'environnement de la Polynésie française).

Management: No information was located.

INDIA

Distribution in range State: *H. kuda* was reported to occur in the Gulf of Mannar (Murugan *et al.,* 2011), on the Coromandel Coast (Balasubramanian, 2002, cited in Murugan *et al.,* 2011) and in Palk Bay (Lipton and Thangaraj, 2002). The CITES Management Authority of India confirmed that the species was found along the entire west coast of India (A. K. Srivastava, *in litt.* to UNEP-WCMC, 2011).

Population trends and status: In the early 2000s, *H. kuda* was considered abundant along the Palk Bay coast, where it accounted for 85.29 per cent of *Hippocampus* spp. by-catch (Lipton and Thangaraj, 2002). In the Gulf of Mannar, *H. kuda* was reported to account for 21.19 per cent of the *Hippocampus* spp. by-catch (Murugan *et al.,* 2011). In the Coromandel Coast, *H. kuda* made up 13 per cent of the *Hippocampus* by-catch (Balasubramanian, 2002, cited in Murugan *et al.,* 2011). *H. kuda* was reported to be one of the three *Hippocampus* species dominating target catch by divers in the south-east coast of India (Salin *et al.,* 2005).

The absence of data on abundances and distributions of *Hippocampus* spp. in India was considered to limit the conservation and management of populations (Sreepada *et al.,* 2002). However *Hippocampus* spp. were believed to be declining in India, based on analysis of by-catch (A. K. Srivastava, *in litt.* to UNEP-WCMC, 2011) and half of the 160 fishers surveyed in India reported having observed decreases in *Hippocampus* spp. catches (A. Perry, unpublished data, cited in Project Seahorse, 2003).

Threats: The CITES MA of India (A. K. Srivastava, *in litt.* to UNEP-WCMC, 2011) considered *Hippocampus* spp. to be threatened by illegal trade, by-catch and habitat degradation. *H. kuda* was considered to be among the most exploited *Hippocampus* species along the Palk Bay coast (Lipton and Thangaraj, 2002). The majority of *Hippocampus* specimens were reported to be caught as by-catch during shrimp trawling (Murugan *et al.,* 2011). The *Hippocampus* spp. of the southern Tamil Nadu coast [south west India] were considered to be under relatively high fishing pressure (Salin *et al.,* 2005).

Trade: According to data in the CITES Trade Database, no trade in *H. kuda* from India was reported 2004-2010. Annual reports from India have been received for all years except 2010. Fishing and trade in *Hippocampus* spp. was thought to have been restricted to the two southern states, Tamil Nadu and Kerala (Vincent, 1996). In 1995, annual exports of dried *Hippocampus* spp. from southern India were estimated at 3.6–6 tonnes (1.5-2.5 million specimens) (Vincent, 1996). In the early 2000s, India was considered one of the largest exporters of dried *Hippocampus* spp. and contributed to about 30 per cent of the trade globally (Sreepada *et al.,* 2002). In 2001, exports of dried specimens were estimated at 9.75 tonnes, although official statistics recorded only 4.34 tonnes, suggesting a high proportion of undeclared trade (Salin *et al.,* 2005). The domestic market was considered negligible (Salin and Mohanakumaran, 2006).

Management: Syngnathids were listed on Schedule I of the Indian Wildlife Protection Act (A. K. Srivastava, *in litt.* to UNEP-WCMC, 2011) in 2001 (Notification S.O. 665(E)), effectively banning all trade in *Hippocampus* spp. (Chapter VA, Indian Wildlife Protection Act, 1972). While the implementation of the ban was found to have led to considerable declines in syngnathid fishing, directed exploitation was observed to have re-gained momentum in mid-2002 in some areas (Lipton and Thangaraj, 2002) and exports were reported to continue illegally (Murugan *et al.,* 2008; Vincent *et al.,* 2011). As trade in sygnathids was banned in India, no non-detriment findings or population assessments were being conducted (A. K. Srivastava, *in litt.* to UNEP-WCMC, 2011).

Murugan *et al.* (2011) reported that *H. kuda* was being bred by the National Institute of Oceanography, in order to conserve the species.

JAPAN

Distribution in range State: The species was reported to occur south of Izu Peninsula (H. Takahashi *in litt.* to UNEP-WCMC, 2011) and its presence was reported from Yudomari [Yakushima Island, southern Japan] (Motomura *et al.,* 2010) and the Ryukyu Islands [southern Japan] (Kuiter, 2000), where it was noted to occur in Okinawa (Lourie *et al.,* 1999a).

Population trends and status: *H. kuda* was not included in the Japanese Red List (Ministry of the Environment, undated) and the population status of the species was considered to be poorly known (Project Seahorse *in litt.* to UNEP-WCMC, 2011; H. Takahashi *in litt.* to UNEP-WCMC, 2011).

Threats: The CITES Management Authority of Japan confirmed that *Hippocampus* spp. was not targeted by directed fishery, and by-catch was considered low (H. Takahashi *in litt.* to UNEP-WCMC, 2011).

Trade: According to data in the CITES Trade Database, the only reported trade in *H. kuda* originating in Japan 2004-2010, was the import of 30 live, captive-bred specimens for educational purposes by the United Arab Emirates in 2008. However the CITES MA of Japan noted that they were not aware of this export and that steps were being taken to clarify this report (H. Takahashi *in litt.* to UNEP-WCMC, 2011). No indirect exports of *H. kuda* originating in Japan were reported 2004-2010. Annual reports from Japan have not yet been received for 2009 and 2010.

Japan entered a reservation for this species in 2004.

Hippocampus spp. was reported to be used for traditional medicine as well as aquarium fishes in Japan, with many specimens likely to originate from imports (Vincent, 1996). While Japan was reported to have exported dried *Hippocampus* spp. in the 1990s, it was not clear whether the specimens originated in the country or whether they consisted of re-exports (Vincent, 1996).

Management: The species is not subject to any population monitoring or management, although fisheries in general were reported to be under the control of Prefectural Governors (H. Takahashi *in litt.* to UNEP-WCMC, 2011). No information on legal protection was found for Japan.

KENYA

Distribution in range State: Occurrence in Kenya reported by Dawson (1986, cited in Fishbase, 2010), although noted to be questionable. Specimens from Kenya were later considered to represent *H. fuscus* and Kenya was therefore not considered to be a range State for *H. kuda* (Lourie *et al.,* 2004; Lourie, 2011).

Population trends and status: No information was located.

Threats: No information was located.

Trade: According to data in the CITES Trade Database, there was no reported trade from in Kenya 2004-2010. Prior to the species' listing in the CITES Appendices in 2004, Germany reported the direct import of two live specimens in 2000. With the exception of 2003, all annual reports have been received from Kenya for the period 2000-2010.

Management: No information was located.

MADAGASCAR

Distribution in range State: Occurrence in Madagascar reported by McKenna and Allen (2005) and Dawson (1986, cited in FishBase, 2010), although noted as questionable. Specimens from Madagascar were later considered to represent *H. borboniensis* or *H. fuscus* and Madagascar was therefore not considered to be a range State for *H. kuda* (Lourie *et al.*, 2004; Lourie, 2011). The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2011) reported that they had no information on *H. kuda* in Madagascar.

Population trends and status: No information was located.

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade from Madagascar was reported 2004-2010. Annual reports from Madagascar have been received for all years.

Management: No information was located.

MALDIVES

Distribution in range State: Occurrence reported by Kuiter (2009) and Lourie (*in litt.* to Foster, 2011).

Population trends and status: No information was located.

Threats: *Hippocampus* spp. did not appear to be targeted in the reef fishery (Sattar, 2008) or harvested for the live aquarium trade (Adam, 1995; Saleem and Adam, 2003).

Trade: According to data in the CITES Trade Database, no trade in *H. kuda* from the Maldives was reported 2004-2010. The Maldives is not a Party to CITES and therefore has not submitted any annual reports.

Management: Capture fisheries are regulated in the Fisheries Law of the Maldives No. 5/87 of 1987, limiting fishing in the coastal area (75 mile radius) to Maldivian fishers only, without a requirement of licensing. No information on the protection status of the species in the Maldives was located.

MAURITIUS

Distribution in range State: Occurrence in Mauritius reported by Baissac (1990, cited in FishBase, 2010), however specimens from Mauritius were later considered to represent *H. borboniensis* or *H. fuscus* and Mauritius was therefore not considered to be a range State for *H. kuda* (Lourie *et al.*, 2004).

Population trends and status: *Hippocampus* spp. was reported not to be common in Mauritius and in need of protection (CoP12 Prop. 37).

Threats: No information was located.

Trade: According to data in the CITES Trade Database, reported trade in *H. kuda* originating in Mauritius 2004-2010 was the direct import of 22 live, wild-sourced specimens by

Germany in 2004 for commercial purposes. Prior to the species' listing in the CITES Appendices in 2004, Germany reported the import of 50 specimens from Mauritius in 2003. Annual reports from Mauritius have been received for all years except 2010.

Management: No information was located.

MICRONESIA (FEDERATED STATES OF)

Distribution in range State: Occurrence in Micronesia confirmed by Lourie *et al.* (1999a; 2004), where the species had been collected from Yap Island (CAS, undated).

Population trends and status: No information was located.

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade from Micronesia was reported 2004-2010. Micronesia is not a Party to CITES and therefore has not submitted any annual reports.

Management: The unlicensed use of explosives or poison for fishing is prohibited (Code of the Federated States of Micronesia on Conservation of Marine Species, Chapter 1 Title 23). Fisheries are regulated according to the legislation of the four states (FAO, 2011). The protection status of the species in Micronesia is unclear.

MOZAMBIQUE

Distribution in range State: Occurrence in Mozambique reported by Teske *et al.* (2005) and Smith (1969, cited in FishBase), although noted to be questionable. Specimens were later considered to represent *H. borboniensis* or *H. fuscus* and Mozambique was therefore not considered to be a range State for *H. kuda* (Lourie *et al.*, 2004).

Population trends and status: No information was located.

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade from Mozambique was reported 2004-2010. All annual reports from this period have been received from Mozambique.

Management: No information was located.

PAKISTAN

Distribution in range State: The occurrence of *H. kuda* in Pakistan was confirmed by the CITES Management Authority of Pakistan (S. Khan, *in litt.* to UNEP-WCMC, 2011); the species was reported to occur in "Kurachei" [Karachi] (Lourie *et al.*, 1999a).

Population trends and status: Surveys in coastal waters undertaken since 1973 discovered only five to six specimens of *H. kuda* and the present and historic population was assumed to be very small (S. Khan, *in litt.* to UNEP-WCMC, 2011). Anecdotal information on *Hippocampus* spp. from the early 2000s indicated low historic abundances and population declines (Project Seahorse *in litt.* to UNEP-WCMC, 2011).

Threats: Habitat degradation and pollution were assumed to threaten *Hippocampus* spp. within Pakistan (S. Khan, *in litt.* to UNEP-WCMC, 2011). Small numbers of *Hippocampus* spp. were reported to be taken in targeted fishery while specimens found in by-catch were discarded (Project Seahorse *in litt.* to UNEP-WCMC, 2011).

Trade: According to data in the CITES Trade Database, no trade from Pakistan was reported 2004-2010. Annual reports from Pakistan have not yet been received for 2009 and 2010.

Commercial exploitation was confirmed to be absent and no evidence of illegal trade had been found (S. Khan, *in litt.* to UNEP-WCMC, 2011). Low numbers of *Hippocampus* spp. were reported to be targeted for the national aquarium market (Project Seahorse *in litt.* to UNEP-WCMC, 2011).

Management: While *Hippocampus* spp. is not legally protected within Pakistan, they are among those species for which export is not permitted, as per Pakistan Fish Inspection and Quality Control Act, 1997 (S. Khan, *in litt.* to UNEP-WCMC, 2011).

The establishment of marine protected areas where *Hippocampus* spp. occur and research on their population status, particularly along Sindh and Balochistan coasts, is required (S. Khan, *in litt.* to UNEP-WCMC, 2011).

PALAU

Distribution in range State: Occurrence in Palau suspected by Lourie *et al.* (2004), however no more detailed distribution information was located.

Population trends and status: No information was located.

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade from Palau was reported 2004-2010. Palau became a Party to CITES in 2004; annual reports from Palau have not yet been received for 2006, 2009 or 2010.

Management: The use of underwater breathing apparatus for fishing is prohibited, as is the taking of aquarium fish, unless exempt or a licence has been granted for local aquarium use or for research purposes (Marine Protection Act of 1994). The use of explosives or poison for fishing is prohibited (Palau National Code, Title 24, Chapter 13).

PAPUA NEW GUINEA

Distribution in range State: The species was reported to occur in Milne Bay, New Britain, Lae [Morobe Province] (Lourie *et al.,* 1999a), Central [province], the Gulf of Papua New Guinea, East Sepik and New Ireland (Baine, 2008).

Population trends and status: A survey of *Hippocampus* spp. in Bootless Bay found 51 specimens from a sample of 65 belonging to the *H. kuda* complex, with 40 per cent females, 28 per cent males and 32 per cent juveniles (Baine, 2008). Mean *Hippocampus* spp. densities in Bootless Bay were estimated at 0.13 specimens/100 m^2, with the population size ranging between 4050 and 5850 specimens (Baine, 2008). A survey of *Hippocampus* spp. at Samarai Island found 53 per cent females, 28 per cent males and 19 per cent juveniles, with at least 25 specimens out of the 36 collected thought to belong to the *H. kuda* complex (Baine, 2008). Densities of *Hippocampus* spp. were estimated at 0.09 specimens/100 m^2, with the total population estimated at 400-720 individuals.

These findings were thought to indicate that *H. kuda* may be the dominant species in Milne Bay and Central province (Baine, 2008).

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade from Papua New Guinea was reported 2004-2010. No annual reports have been received from Papua New Guinea since 2007.

Baine (2008) found no formal internal or export trade, apart from "anecdotal evidence" of artisanal trade between locals of Milne Bay and Asian residents.

Management: The use of explosives and poison for fishing is prohibited (Fisheries

Management Act 1998), however the protection status of the species in Papua New Guinea is unclear.

A proposal for seahorse aquaculture was reported to have been submitted to the PNG National Fisheries Authority, but the project was never started (Baine, 2008).

PHILIPPINES

Distribution in range State: The species' occurrence was reported from the islands of Bohol, Busuanga, Daram, Luzon (Magellanes, Padre Burgos, Sorsogon, Tagkawayan, and Quezon), Palawan and Samar, in the central Philippines, Jandayan Island (Lourie *et al.,* 2005).

Population trends and status: Declines of 50-95 per cent in *Hippocampus* spp. were reported by fishers in the Philippines between 1980 and 1997 (Pajaro, unpublished data, cited in Project Seahorse, 2003). No other information on status was located.

Threats: *Hippocampus* spp. were considered to be vulnerable due to trade for traditional medicine, curios and aquaria (Vincent, 1996), with annual *Hippocampus* spp. by-catch in the Philippines estimated at two to six million specimens (Pajaro, unpubl. data, cited in Vincent *et al.,* 2011). Specimens were also reported to be targeted directly by divers (Martin-Smith *et al.,* 2004; Vincent *et al.,* 2007) and habitat destruction was considered a threat (Vincent, 1996).

Trade: According to data in the CITES Trade Database, no trade originating in the Philippines has been reported since 2004, with the exception of one live specimen reported as seized or confiscated in 2007 (Table 4). Annual reports have been received from the Philippines for every year except 2008 and 2010. No indirect exports of *H. kuda* originating in the Philippines were reported 2004-2010.

Table 4. Direct exports of *Hippocampus kuda* from the Philippines, 2004-2010. The species was listed in Appendix II on 15/05/2004. (No trade was reported in 2005, 2006 or since 2007.)

Term	Source	Purpose	Reported by	2004	2007	Total
live	W	T	Exporter			
			Importer	800		800
	-	-	Exporter			
			Importer	413		413
	I	T	Exporter			
			Importer		1	1
bodies	I	-	Exporter			
			Importer	10		10

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Prior to the listing of *Hippocampus* spp. in CITES Appendix II, the Philippines was considered a major exporter seahorses (Project Seahorse *in litt.* to UNEP-WCMC, 2011). Three areas, Palawan (incl. Busuanga), the central Visayas (incl. Bohol, Cebu and Negros) and Mindanao (including Sulu and Tawi Tawi in the southern Philippines) were reported to be the main source of specimens in the mid 1990s (Vincent, 1996). Vincent (1996) estimated annual exports of dried *Hippocampus* spp. from the Philippines at 3.5- 11 tonnes (1.5-4.7 million specimens) and those of live specimens at more than 0.5 million specimens. *H. kuda* was reported to be one of the most highly traded *Hippocampus* species in the Philippines (Garcia and Hilomen-Garcia, 2009).

Management: Fishing, taking and trade of any species included in the CITES Appendices is prohibited in the Philippines, as per Section 97 of the Fisheries Code (Philippines, 1998; E. Alesna, pers. comm. to UNEP-WCMC, 2011). However, illegal fishing was reported to

continue, due to lack of enforcement and alternative sources of income (O'Donnell *et al.*, 2010). The CITES Management Authority of the Philippines noted that no species-specific monitoring was being conducted (E. Alesna, pers. comm. to UNEP-WCMC, 2011).

A facility established in Handumon, central Philippines, was reported to be breeding *Hippocampus* spp. in captivity (Vincent, 1996).

REPUBLIC OF KOREA

Distribution in range State: Occurrence in the Republic of Korea confirmed by Kim *et al.* (2005, cited in FishBase, 2010). However no more detailed distribution information was located.

Population trends and status: The species was not included in the Korean Red Data Book 2009 (Ministry of Environment, 2009). Little is known about the population status of *Hippocampus* spp. or which species occur in the Republic of Korea (Project Seahorse *in litt.* to UNEP-WCMC, 2011).

Threats: No evidence of a target fishery, but *Hippocampus* spp. was reported to be caught as by-catch, although the scale and use of such specimens was unknown (Project Seahorse *in litt.* to UNEP-WCMC, 2011). *Hippocampus* spp. was reported to be used for the local traditional medicine 'hanyak' (Vincent *et al.*, 2011).

Trade: According to data in the CITES Trade Database, no trade in *H. kuda* from the Republic of Korea was reported 2004-2010. Annual reports have been received from the Republic of Korea for every year except 2009 and 2010.

Management: The use of explosives and poison is prohibited (Fisheries Act 1990), however the protection status of the species is unclear.

SAMOA

Distribution in range State: Occurrence in Samoa suspected by Lourie *et al.* (2004), however no more detailed distribution information could be located.

Population trends and status: No information was located.

Threats: No information was located.

Trade: According to data in the CITES Trade Database, no trade in *H. kuda* from Samoa was reported 2004-2010. Samoa became a Party to CITES in 2005; no annual report has yet been received for 2010.

Management: The use of poison and explosives is banned (Fisheries Act 1988), however the protection status of the species in Samoa is unclear.

SINGAPORE

Distribution in range State: *H. kuda* was reported to occur at the shores of Changi and Tanah Merah [east], Chek Jawa [a wetland on the island of Pulau Ubin off the north-eastern coast], Beting Bronok [off Pulau Tekong island, eastern Singapore] and Cyrene Reef [south west] (F. K. Lye, pers. comm. to UNEP-WCMC, 2011). Kuiter (2009) also reported the species from Pulau Sekudu, Sisters Islands and Labrador, based on photographs.

Population trends and status: The number of *H. kuda* found in Singapore's coastal waters was considered to be low (Reddy *et al.*, 2011). The species was considered more common in the north of Singapore than along the southern shores, due to the species' preference for habitats with freshwater influx (F. K. Lye, pers. comm. to UNEP-WCMC, 2011). Despite the many surveys conducted at Cyrene Reef (a southern offshore reef), only 1-2 specimens of *H. kuda* were found and the species was considered not to be very common. Surveys were

considered to be needed to assess the abundance of the species (F. K. Lye, pers. comm. to UNEP-WCMC, 2011).

The species was categorised as Vulnerable in the 2008 Red Data Book (Ng *et al.,* 2008).

Threats: Habitat loss due to coastal development was considered to be the biggest threat to *Hippocampus* spp. in Singapore (F. K. Lye, pers. comm. to UNEP-WCMC, 2011). In 1998-2001, some traders were reported to source their stock locally (Project Seahorse *in litt.* to UNEP-WCMC, 2011).

Trade: According to data in the CITES Trade Database, no trade originating in Singapore has been reported since 2005 (Table 5). Annual reports have been received from Singapore for every year. No indirect exports of *H. kuda* originating in Singapore were reported 2004-2010.

Table 5. Direct exports of *Hippocampus kuda* from Singapore, 2004-2010. All trade was in live specimens. The species was listed in Appendix II on 15/05/2004. (No trade has been reported since 2005.)

Source	Purpose	Reported by	2004	2005	Total
W	T	Exporter			
		Importer	185	26	211
-	-	Exporter			
		Importer	86		86

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

The CITES Scientific Authority of Singapore (F. K. Lye, pers. comm. to UNEP-WCMC, 2011) noted that a total of 277 *Hippocampus* spp., originating in Indonesia and China, had been found in illegal trade 2008-2010 (F. K. Lye, *in litt*. to UNEP-WCMC, 2011).

Management: Section 5 of the Wild Animals and Birds Act 1965, rev. 2000 (Chapter 351) prohibits the killing, taking or keeping of any wild animal or bird without a licence (Singapore, 1965), however, such licences were reported to not have been issued "for many years" (Heng, 2007). The Endangered Species (Import and Export) Act 2006 prohibits the trade in endangered animals without a permit (Singapore, 2006; F. K. Lye, *in litt.* to UNEP-WCMC, 2011). The Fisheries Act 1970 prohibits the use of explosives, poison or trawl nets to trap fish (Singapore, 1970).

The CITES Scientific Authority of Singapore (F. K. Lye, pers. comm. to UNEP-WCMC, 2011) confirmed that no CITES permits for locally sourced *Hippocampus* spp. had been issued, that harvest of *Hippocampus* spp. was not taking place for commercial trade and therefore non-detriment findings were not being made.

The CITES Scientific Authority of Singapore (F. K. Lye, pers. comm. to UNEP-WCMC, 2011) noted that *Hippocampus* spp. were being successfully bred in captivity in Singapore.

SOLOMON ISLANDS

Distribution in range State: The species' occurrence in the Solomon Islands was confirmed by Lourie *et al.* (1999a; 2004), but no further information on the distribution could be located.

Population trends and status: No information was located.

Threats: No information was located.

Trade: According to data in the CITES Trade Database, reported trade originating in the Solomon Islands between 2004 and 2010 comprised one wild-sourced scientific specimen imported by the United States from Canada in 2008. The Solomon Islands became a Party to CITES in 2007 and has not yet submitted any annual reports.

Management: The use of explosives or poison is prohibited (Fisheries Act 1998), however the protection status of the species is unclear.

THAILAND

Distribution in range State: The species' occurrence in Thailand was confirmed by Lourie (1999; 2004).

Population trends and status: The species was categorised as Vulnerable in the Thai Red Data Book 2005 (Vidthayanon, 2005) and the abundance of *Hippocampus* spp. was reported to have declined (Perry *et al.*, 2010). The species did not appear to be among the species caught in the Gulf of Thailand or Andaman Sea (Y. Getpech, *in litt.* to UNEP-WCMC, 2011).

Threats: The CITES Management Authority of Thailand (Y. Getpech, *in litt.* to UNEP-WCMC, 2011) considered *Hippocampus* spp. to be threatened by habitat change, by-catch, invasive species and trade for traditional medicine. Seahorse harvest was reported to be mostly from by-catch and the genus was not targeted directly (Y. Getpech, *in litt.* to UNEP-WCMC, 2011). Annual *Hippocampus* by-catch was reported to consist of 2.1 million specimens (Anon., 2001, cited in Perry *et al.*, 2010). Fishing for *Hippocampus* spp. was reported to generally occur during the non-monsoon season from October to February, which was thought to be the breeding season for many species (Vincent, 1996).

Trade: According to data in the CITES Trade Database, direct exports reported by Thailand 2004-2010 comprised 1916.24 kg of wild-sourced bodies traded for commercial purposes (Table 6). Importer-reported trade remained relatively constant 2006-2008 but decreased between 2008 and 2009. Prior to the CITES listing in 2004, two live, wild-sourced specimens for commercial purposes and 4.2 bodies without a source or purpose were imported from Thailand in 2000 and 2003, respectively.

Table 6. Direct exports of *Hippocampus kuda* from Thailand, 2004-2010. All trade was wild-sourced for commercial purposes. The species was listed in Appendix II on 15/05/2004. (No trade was reported in 2010.)

Term	Units	Reported by	2004	2005	2006	2007	2008	2009	Total
bodies	kg	Exporter	242.74	385.5	620	58	350	260	1916.24
		Importer		185	340	338	350	205	1418

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Re-exports of *H. kuda* originating in Thailand 2004-2010 consisted of 112 kg of wild-sourced derivatives in 2008 and 353 kg of wild-sourced bodies in 2009, all of which were re-exported from China to Japan for commercial purposes. Annual reports from Thailand have been received for all years except 2010.

In the mid 1990s, Thailand was estimated to export 15 tonnes (4.5 million specimens) of dried *Hippocampus* specimens annually (Vincent, 1996).

Management: The export of live *Hippocampus* spp. caught in Thai waters was reported to be prohibited since 1988 (Entry and Exit of Goods Act, 1979) (Y. Getpech, *in litt.* to UNEP-WCMC, 2011), but illegal exports were thought to have continued (Perry *et al.*, 2010). Further information on the Notifications under the Thai Fishery Law and other management measures, as provided by the Thai Management Authority (Y. Getpech, *in litt.* to UNEP-WCMC, 2011), can be found in the management section for Thailand in the review of *H. kelloggi*.

TONGA

Distribution in range State: The species' occurrence in Tonga was confirmed by Lourie *et al.*

(1999a; 2004), however no more detailed distribution information could be located.

Population trends and status: No information on the population status of the species in Tonga could be located. The Aquaculture Research & Inshore Fisheries of Tonga (P. Ngaluafe pers. comm. to UNEP-WCMC, 2011) confirmed that no baseline studies on the species had been conducted and that it was unclear which species of *Hippocampus* occurred in Tonga.

Threats: No information was located.

Trade: No direct trade from Tonga was reported 2004-2010 according to data in the CITES Trade Database. The re-export of six live, wild-sourced specimens was reported by the United States to Canada in 2008 for commercial purposes. Tonga is not a Party to CITES and therefore has not submitted any annual reports.

Management: The use of explosives or poison is prohibited (Fisheries Act 1989) and licences are required for the take of aquarium fish (Fisheries Conservation and Management Regulations 1994). Trade is monitored in Tonga, however this species was noted to not be commercially harvested, nor were any licences issued (P. Ngaluafe pers. comm. to UNEP-WCMC, 2011). However the species was reported to not be legally protected in Tonga (P. Ngaluafe pers. comm. to UNEP-WCMC, 2011).

Ngaluafe (pers. comm. to UNEP-WCMC, 2011) noted that a Hawaiian company had recently showed interest in initiating an aquaculture facility on Tonga to breed *Hippocampus* spp.

VIET NAM

Distribution in range State: *H. kuda* was reported to occur along the coastline, from north to south Viet Nam (T. M. Vuong, *in litt.* to UNEP-WCMC, 2011), from Da Nang (north), Ba Ria-Vung Tau [province] to Kien Giang [province] (south-western Viet Nam), including Con Dao [island] district (Institute for Science and Technology of Vietnam, 2007).

Population trends and status: Landings of *Hippocampus* spp. in Viet Nam showed geographic variations, with fewer caught in the north of Viet Nam than in the south, although it was unclear whether this was due to variations in abundance or fishing method used (Giles *et al.,* 2006). Observed by-catch in landings of the Cua Be fishing fleet (Central Coast) between 1996 and 2000, consisted of 4 per cent *H. kuda;* this area was reported to be a major source for *Hippocampus* specimens (Meeuwig *et al.*, 2006).

H. kuda was categorised as Endangered in the Viet Nam Red Data Book (Institute for Science and Technology of Vietnam, 2007) and as Endangered in the "list of endangered aquatic species in Vietnam which need protection, reproduction and development" (Decision No. 82/2008/QD-BNN) issued by the Ministry of Agriculture (T. M. Vuong, pers. comm. to CITES Secretariat, 2011). The *H. kuda* population was reported to have declined significantly (T. M. Vuong, *in litt.* to UNEP-WCMC, 2011), with further reductions at a rate of 20 per cent per year expected and the species was therefore considered to be in risk of depletion in the near future (Institute for Science and Technology of Vietnam, 2007). As *Hippocampus* spp. in Viet Nam was reported to be mainly obtained though by-catch, declines in numbers were thought to reflect general fish declines (Vincent, 1996).

Threats: The Vietnamese CITES Management Authority (T. M. Vuong, *in litt.* to UNEP-WCMC, 2011) listed habitat destruction, pollution, climate change and by-catch as major threats, with pressure through over-harvest for traditional medicine considered high.

Non-selective trawling was considered to pose the greatest threat to *Hippocampus* spp. in Viet Nam, rather than trade, although *H. kuda* was noted to be one of the most widely encountered species in trade (Giles *et al.*, 2006). *Hippocampus* spp. by-catch was estimated at

about 6.5 tonnes (2.3 million specimens) annually over five coastal provinces (Bac Lieu, Kien Giang, Binh Thuan, Ca Mau and Khanh Hoa) (Giles *et al.*, 2006); *H. kuda* was included in the by-catch from shrimp trawling (Meeuwig *et al.*, 2006). *Hippocampus* spp. were also reported to be collected via compressor diving (K. S. Truong pers. comm., cited in Morgan and Panes, 2008), however only small numbers and mainly *H. kuda* were reported to be hand-caught (Giles *et al.*, 2006).

Vincent (1996) considered the destruction of habitat a possibly larger threat than trade.

Trade: According to data from the CITES Trade Database, direct exports of *H. kuda* from Viet Nam 2004-2010, consisted of 335 480 live specimens and 26 940 bodies as reported by Viet Nam, and 233 119 live specimens and 17 271 bodies as reported by importers (Table 7). All trade was reported for commercial purposes, and the majority of recent trade involved captive-born animals. The United States reported the seizure or confiscation of a total of 762 live specimens between 2007 and 2009. Annual reports have been received from Viet Nam for every year.

An export quota for 77 000 wild-sourced, live specimens of *H. kuda* was published by Viet Nam for the first time in 2011. Although the source code has not been published on the CITES website (as of 24 November, 2011), the CITES MA of Viet Nam noted that the quota only applied to captive-bred specimens (T.M. Vuong, pers. comm. to UNEP-WCMC, 2011a).

Table 7. Direct exports of *Hippocampus kuda* from Viet Nam, 2004-2010. The species was listed in Appendix II on 15/05/2004. (No trade was reported in 2004.)

Term	Source	Reported by	2005	2006	2007	2008	2009	2010	Total
live	W	Exporter	14350	28710			400	1000	44460
		Importer	2902	36538	26917	9520	7094	1182	84153
	C	Exporter		37270					37270
		Importer		16443	1530	100	462	184	
	F	Exporter		20550	59020	74150	46030	54000	253750
		Importer		150	28362	42208	30006	28759	129485
	I	Exporter							
		Importer			17	735	10		762
bodies	W	Exporter							
		Importer					8800		8800
	F	Exporter					26900	40	26940
		Importer			71	8250	150		8471

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Indirect trade in *H. kuda* originating in Viet Nam principally comprised live specimens traded for commercial purposes, of which the majority were wild-sourced and the remainder captive-born or captive-bred.

The CITES MA of Viet Nam (T. M. Vuong, *in litt.* to UNEP-WCMC, 2011) provided data on trade in *H. kuda* 2006-2011 (Table 8) and confirmed that *H. kuda* exports from Viet Nam were legally sourced from captive-breeding facilities and denoted as source 'F'. The Management Authority noted that the discrepancy between their data and that held within the CITES Trade Database may be due to some of their records having been mislaid, or to permits having been cancelled (T. M. Vuong, pers. comm. to UNEP-WCMC, 2011b).

Table 8. Exports of *Hippocampus kuda* since 2006 according to the CITES Management Authority of Viet Nam.

2006	2007	2008	2009	2010	2011
86530	33220	74950	71580	50040	32000

Source: T. M. Vuong, *in litt.* to UNEP-WCMC, 2011

Viet Nam was reported to be one of the top five producers of dried *Hippocampus* spp. in the world (Project Seahorse, unpubl. data, cited in Giles *et al.,* 2006). Vincent (1996) estimated the annual exports of dried *Hippocampus* spp. from Viet Nam to be five tonnes. While internal trade in "seahorse tonic" was reported to exist (CoP12 Prop. 37), the majority of specimens were exported into China, "generally through unofficial and unregulated channels" (Giles *et al.*, 2006). Information on the nature and size of the trade was considered insufficient (Giles *et al.,* 2006). The Vietnamese CITES Management Authority (T. M. Vuong, *in litt.* to UNEP-WCMC, 2011) noted that *H. kuda* "may be the most commonly found seahorse species in illegal trade in Vietnam".

Management: The CITES MA of Viet Nam (T.M. Vuong, *in litt.* to UNEP-WCMC, 2011) noted that non-detriment findings had not been conducted. They noted that *H. kuda* is successfully bred in captivity in Viet Nam (T.M. Vuong, *in litt.* to UNEP-WCMC, 2011) and legally sourced from captive breeding facilities, which are considered to be in line with Conf. Res. 10.16 (T. M. Vuong, pers. comm. to CITES Secretariat, 2011); export of seahorses taken from the wild is not permitted until non-detriment findings have been conducted (T.M. Vuong, pers. comm. to UNEP-WCMC, 2011a).

No species specific monitoring program was in place except those on the monitoring of biodiversity in general (T.M. Vuong, *in litt.* to UNEP-WCMC, 2011).

Harvest of *Hippocampus* spp. within the core zones of five Marine Protected Areas (MPA) was reported to be prohibited, with plans to increase the number of existing MPAs (T. M. Vuong, *in litt.* to UNEP-WCMC, 2011).

Further information on legislation and other management measures, as provided by the Viet Nam Management Authority (T. M. Vuong, *in litt.* to UNEP-WCMC, 2011), can be found in the management section for Viet Nam in the review of *H. kelloggi*.

D. Problems identified that are not related to the implementation of Article IV, paragraphs 2 (a), 3 or 6 (a)

By-catch was reported as a main threat. Illegal trade was reported to be occurring in Cambodia, India, Singapore, Thailand and Viet Nam. Trade in *Hippocampus* spp. has been reported at the genus level, making the monitoring of trade in individual species difficult. Furthermore, the mixed reporting of units (specimens and weight (kg)) makes it difficult to estimate the total number of specimens in international trade.

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Hippocampus spinosissimus Weber, 1913: Cambodia, People's Republic of China, Myanmar, the Philippines, Singapore, Sri Lanka, Thailand, Viet Nam.

Syngnathidae, Hedgehog Seahorse.

Selection for Review of Significant Trade

Hippocampus spinosissimus was selected for review following the 24th meeting of the Animals Committee on the basis of trade data provided in document AC23 Doc. 8.5, noting that in 2006 and 2007 trade amounted to many thousands of individuals (AC24 Summary Record). At the 25th Animals Committee meeting, the working group decided to exclude Australia, Indonesia and Malaysia from the review, while retaining Cambodia, the People's Republic of China (hereafter referred to as China), Myanmar, the Philippines, Singapore, Sri Lanka, Thailand, and Viet Nam in the in the Review of Significant Trade process, as they failed to report or provide sufficient information to a request of information from the CITES Secretariat, sent in July 2009 (AC25 Doc. 9.5).

A. Summary

Overview of *Hippocampus spinosissimus* recommendations.

Range State	Provisional category	Summary
Cambodia	Least Concern	Status poorly known with much of the available information at the genus level. *Hippocampus* spp. was reported to be targeted by direct fishery and be threatened through by-catch; illegal trade has also been reported. However, protected in Cambodia and no international trade in *H. spinosissimus* reported 2004-2010. On the basis of no anticipated international trade, categorised as Least Concern. Furthermore, it is envisaged that trade would be permitted only in the event that substantial new information on the status of species was available.
People's Republic of China	Least Concern	Status poorly known, with much of the available information at the genus level. *Hippocampus* spp. is threatened by harvest particularly as by-catch. Apart from a seizure of 37 bodies no international trade was reported 2004-2010. Exports of wild *Hippocampus* spp. were banned in 2011. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Myanmar	Least Concern	Population considered small and discontinuous but not targeted directly by fisheries. No international trade was reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Philippines	Least Concern	Status poorly known with reports of population declines. Illegal fishing was reported although harvest and trade in wild specimens is prohibited. No international trade reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Singapore	Least Concern	Considered either rare or extinct in Singapore. Harvest and trade is prohibited without permits and commercial harvest was not taking place. No international trade was reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.
Sri Lanka	Least Concern	The species is not abundant in Sri Lanka. Permits are no longer issued for export. No international trade was reported 2004-2010. Therefore, on the basis of no anticipated trade, categorised as Least Concern.

Range State	Provisional category	Summary
Thailand	Urgent Concern	*H. spinosissimus* was categorised as Vulnerable in the Thai Red Data Book and *Hippocampus* spp. was considered to be threatened by overfishing, particularly through bycatch. Illegal trade in *Hippocampus* spp. was also reported. While the export of live *Hippocampus* spp. is not permitted, this does not appear to apply to dried specimens. International trade in wild specimens (bodies, reported in kg) was high 2004-2009, potentially representing several million of specimens. The impact of trade is unknown, and available information indicates that exports are occurring without a scientifically based non-detriment finding, therefore categorised as Urgent Concern. In January 2012, as this report was going to press, the Thai Management Authority submitted additional information on population surveys and management of *Hippocampus* spp.. This information will be presented at the Animals Committee.
Viet Nam	Least Concern	The species has a relatively wide distribution and may have been relatively abundant in the past, but population declines have been reported. By-catch and localised overharvest were considered main threats to the species. Relatively high levels of international trade in 2005 and 2006 but none reported 2007-2010. The CITES MA for Viet Nam confirmed that trade in wild specimens would not be permitted until a non-detriment finding had been made. Therefore, on the basis of no anticipated trade in wild specimens, categorised as Least Concern.

B. Species overview

Biology: *Hippocampus spinosissimus* occurs in waters with a sandy or muddy sea floor (Lourie *et al.,* 1999a) and coral reef, containing octocorals, macro algae and sponges (Lourie *et al.,* 1999b; Choo and Liew, 2003). The species is generally found at depths greater than 8 m (Lourie, 2001), with 70 m being the maximum reported depth (Morgan and Panes, 2008). *H. spinosissimus* was also found in areas exposed to strong tidal currents (Kuiter, 2009).

The maximum recorded height for the species is 17.2 cm, with the height at maturity between 9.8 and 13.2 cm (Nguyen and Do, 1996, cited in Morgan and Panes, 2008). Breeding starts at 6-12 months after birth (Truong, 1995, cited in Foster and Vincent, 2004).

The sex ratio in *Hippocampus* populations is equal (Lourie *et al.,* 1999a) and animals are monogamous within a breeding cycle (Foster and Vincent, 2004). The reproductive rate of *Hippocampus* spp. is considered to be limited, due to the combination of small brood sizes and lengthy parental care (Lourie *et al.,* 1999a). *H. spinosissimus* breeds year round, with breeding peaks from May to October (Truong, 1995, cited in Foster and Vincent, 2004); the maximum brood size is 683 young (Nguyen and Do, 1996, cited in Morgan and Panes, 2008).

Hippocampus spp. have small home ranges, low mobility and low natural adult mortality (Vincent, 1996). They are thought to live between 1-5 years (Vincent and Koldewey, 2006), but data on survival rates and other life history parameters were considered limited to virtually non-existent (Foster and Vincent, 2004).

Taxonomic note: Several taxonomic revisions of the genus *Hippocampus*, including *H. spinosissimus*, were reported to have taken place (Lourie *et al.,* 1999a; 2004) and Vincent *et al.* (2011) called for caution with regard to species designations in *Hippocampus* trade and studies, due to the likelihood of species misidentifications. *H. spinosissimus* was

considered morphologically variable and was thought to possibly consist of more than one species (Lourie *et al.,* 1999a). It was reported to be commonly confused with *H. histrix* (Lourie *et al.,* 2004). Lafrance and Vincent (2011) considered *H. aimei* and *H. arnei* to be synonyms, while Lourie (*in litt.* to S. Foster, cited in S. Foster *in litt*. to UNEP-WCMC, 2011) noted that Kuiter (2009) considered *H. arnei* to replace *H. spinosissimus* in Southeast Asia and Australia. Based on morphometric and genetic data, *H. queenslandicus* was also suggested as a synonym for the species (P. Teske & S. Lourie, unpublished data, cited in Morgan and Panes, 2008), while Kuiter (2009) considered this name to represent a distinct species in Australia.

General distribution and status: The distribution of *H. spinosissimus* was reported to range from the Central Indian Ocean (near India and Sri Lanka), South China Sea, Philippine Sea, Java Sea, Celebes Sea to the Banda Sea, possibly also including the eastern Indian Ocean, Coral Sea and Tasman Sea (including New Zealand) (Lourie *et al.,* 1999a; Lourie *et al.,* 2004). Kuiter (2000) however considered the species' range to be restricted to northern Australia and southern Indonesia; a few photographs as far as the Philippines were thought to possibly also represent *H. spinosissimus* (R. Kuiter, 2011, pers. comm. to UNEP-WCMC, 2011).

Hippocampus spp. were found to occur at low densities and the discontinuous nature of suitable habitat was thought to lead to a fragmented distribution of populations (CoP12 Prop. 37). In general, densities of *H. spinosissimus in situ* were reported to be undocumented (Morgan and Panes, 2008). In southern Indian waters, *H. spinosissimus* was considered common and widely distributed (Salin and Mohanakumaran, 2006) and the species was found to be genetically highly diverse, which was thought to indicate large populations historically (Lourie *et al.,* 2005). Furthermore, *H. spinosissimus* populations were thought to be more highly connected, due to fewer barriers in their deep water habitats (Lourie *et al.,* 2005).

H. spinosissimus was categorised as Vulnerable in the IUCN Red List, as the species was considered threatened by targeted fishery, by-catch and habitat degradation, with inferred declines of at least 30 per cent (Project Seahorse, 2003b).

Direct exploitation, by-catch and habitat destruction were considered to be major threats to *Hippocampus* spp. (Vincent, 1996; Project Seahorse, 2003a) with the majority of *Hippocampus* spp. reported to be caught as by-catch during shrimp trawls (McPherson and Vincent, 2004; Giles *et al.,* 2006; Perry *et al.,* 2010). Although *H. spinosissimus* was reported to be less desirable for traditional medicine than non-spiny species (Project Seahorse, 2003b), the rise in traditional medicine was reported to have led to an increase in use of spiny species (Vincent, 1996) and *H. spinosissimus* was considered to be amongst the species under greatest threat from unsustainable harvest for traditional medicine (CoP12 Prop. 37).

The biological characteristics of *Hippocampus* spp. were considered likely to render them vulnerable to over-fishing and unsuitable for intense harvesting (Vincent, 1996; Foster and Vincent, 2004). These characteristics were also thought to explain the substantial declines in *Hippocampus* populations observed by fishermen and traders worldwide (Vincent, 1996). However, Curtis *et al.* (2007) found that demersal fishing may not reduce numbers in all *Hippocampus* species and Martin-Smith and Vincent (2005) also observed fisheries-independent declines.

While overall little information was reported to be available on changes in abundance (Project Seahorse, 2003b), substantial declines in *H. spinosissimus* were reported from heavily fished areas (CoP12 Prop. 37). Furthermore, indirect evidence was thought to point at reductions and *H. spinosissimus* was thought to be "particularly susceptible to decline",

although the proportion of the population affected was not clear (Project Seahorse, 2003b).

A clear understanding of life history and ecology was considered essential for management of *Hippocampus* spp. (Curtis *et al.,* 2007), with robust monitoring required to assess conservation actions (Martin-Smith and Vincent, 2005).

Overview of trade and management in the species: *H. spinosissimus* was listed in CITES Appendix II on 15/05/04. Trade from the selected range States 2004-2010 consisted primarily of wild-sourced bodies, with smaller quantities of live specimens, traded for commercial purposes. The main range State involved in trade in bodies was Thailand, with all the live specimens originating in Viet Nam. There was also trade recorded at the genus level (*Hippocampus* spp.), particularly by importers, including 8738 live specimens, 22 811 bodies, 1425 kg bodies, 28 998 derivatives and 133 kg derivatives.

In 2004, a voluntary minimum height limit of 10 cm for international trade in wild *Hippocampus* specimens was recommended by the Animals Committee at its 20th meeting (CITES Notification 2004/033; CITES Notification 2005/014). Curtis and Vincent (2008) recommended a precautionary minimum size limit of 14 cm, pending socioeconomic and management evaluation. No export or re-export permits are required for up to four dead specimens of *Hippocampus* spp. per person for personal or household effects, as per CITES Resolution Conf. 13.7 (Rev. CoP 14).

H. spinosissimus was reported to be traded in large numbers (Koldewey and Martin-Smith, 2010), with specimens sold into the aquarium, curiosity and traditional medicine trades (Project Seahorse, 2003b). Actual global trade in *Hippocampus* spp. was thought to be significantly higher than the legal trade reported (Nijman, 2010; Vincent *et al.,* 2011).

Koldewey and Martin-Smith (2010) reported that demand for *Hippocampus* spp. could not yet be met though aquaculture, but considered *H. spinosissimus* suitable for aquaculture and the species was reported to be bred by a commercial operation in one non-range-State. The majority of aquaculture facilities surveyed were reported to supply the live aquarium trade, with only two also providing specimens for traditional medicine and curios (Koldewey and Martin-Smith, 2010).

C. Country reviews

CAMBODIA

Distribution in range State: The species was reported to occur near the provinces of Kampot, Kampong Saom [southern Cambodia] (Lourie *et al.,* 2005) and Koh Rong Samloem island (MCC, 2011c).

Population trends and status: *Hippocampus* spp. numbers were reported to have declined drastically and although considered abundant in the past, some of the seven species previously recorded in Cambodia have not been recorded recently (MCC, 2011a). In Koh Koun (island north of Koh Rong Samloem), *H. spinosissimus* was abundant and dominated the *Hippocampus* spp. composition, while other *Hippocampus* species had declined substantially since 2007, due to trawling activities (MCC, 2011c).

Threats: Targeted fishing, large scale by-catch and habitat destruction were considered threats to *Hippocampus* spp. in Cambodia (MCC, 2011a), with cyanide or dynamite fishing and by-catch listed as further threats to marine life (MCC, 2011b).

Trade: According to data in the CITES Trade Database, no trade from Cambodia was reported 2004-2010. Annual reports have not been received from Cambodia for 2009 or 2010.

Management: Capture, killing or trade of *Hippocampus* spp. was reported to be prohibited

(Project Seahorse *in litt.* to UNEP-WCMC, 2011). *Hippocampus* spp. was reported to be classified as endangered within a sub-decree of the Royal Government of Cambodia (Atkins *et al.*, 2010).

Trawling between the shore and waters of 20 m depth is not permitted, nor is the use of explosives, electricity and other "modern fishing gears not yet mentioned in the Proclamation of the Ministry of Agriculture" (Fisheries Management and Administration Fiat Lay No. 33 KRO.CHOR, 1987).

Although two conservation areas established around Koh Rong Samloem and Koh Rong were expected to be important for the conservation of *Hippocampus* spp., conservation and management plans were considered to be urgently needed (MCC, 2011a).

PEOPLE'S REPUBLIC OF CHINA

Distribution in range State: The species was reported from Taiwan POC (X. Meng, *in litt.* to UNEP-WCMC, 2011), where it was found in I-Lan [Yilan, north eastern Taiwan POC] (Lourie *et al.,* 2005) and it was considered to possibly occur elsewhere in China including Hong Kong SAR (Lourie *et al.,* 2004).

Population trends and status: The CITES Management Authority of China (X. Meng, *in litt.* to UNEP-WCMC, 2011) noted that *Hippocampus* spp. showed a scattered distribution and low population densities. Domestic sources of *Hippocampus* spp. were considered to be depleted (Vincent *et al.,* 2005). *H. spinosissimus* was not listed in the Chinese Red Data Book (Wang and Xie, 2004).

Threats: Demand for traditional medicine was reported to have depleted local supplies of *Hippocampus* spp. and, as demand was not being met, smaller specimens were reported to be used, primarily for traditional medicine (Vincent, 1996). Overfishing was considered a threat to *H. spinosissimus* and pressure on wild populations was expected to increase (Wang and Xie, 2004) although the genus was reported to be obtained through by-catch rather than through a target fishery in China (X. Meng, *in litt.* to UNEP-WCMC, 2011; Vincent, 1996) and Taiwan POC (CoP12 Prop. 37). Habitat destruction was also considered a threat to the species (Wang and Xie, 2004).

Trade: According to the CITES Trade Database, trade from China 2004-2010 comprised the seizure or confiscation of 37 bodies on import by the United States in 2007. Annual reports from China have been received for all years.

Domestic trade in *Hippocampus* spp. in the mid 1990s was thought to amount to at least 20 tonnes (five to six million specimens) annually (Vincent, 1996) and 7 tons in 2007 (X. Meng, *in litt.* to UNEP-WCMC, 2011). Annual harvests of 20 tonnes *Hippocampus* spp. were reported to be taken in three provinces (CoP12 Prop. 37). The CITES MA of China noted that higher volumes of *H. spinosissimus* were being imported than exported (X. Meng, *in litt.* to UNEP-WCMC, 2011). Viet Nam was considered to be an important trading partner, although most of the trade between the two countries was considered to be illicit (Vincent, 1996).

Management: The export of wild *Hippocampus* spp. was banned on 01/01/2011 until further notice (J. He, pers. comm. to UNEP-WCMC, 2011), with the exception of small numbers for art collections (X. Meng, *in litt.* to UNEP-WCMC, 2011).

Further information on legislation and other management measures, as provided by the China Management Authority (X. Meng, *in litt.* to UNEP-WCMC, 2011), can be found in the review of *H. kelloggi*.

MYANMAR

Distribution in range State: The species reported to occur in the Andaman Sea in southern Myanmar, in the waters bordering Thailand (Lourie *et al.,* 2005) and in Thandwe, Kyaukphyu, Launglone, Thayetchaung, Myeik and Kawthaung in the Bay of Bengal (A. M. Maung, *in litt.* to UNEP-WCMC, 2011).

Population trends and status: The population of *H. spinosissimus* was considered to be small and discontinuous, based on how rarely the species was found as by-catch (A. M. Maung, *in litt.* to UNEP-WCMC, 2011).

Threats: The species was reported not to be targeted directly by fisheries (A. M. Maung, *in litt.* to UNEP-WCMC, 2011).

Trade: According to data in the CITES Trade Database, no trade from Myanmar was reported 2004-2010. Annual reports have not yet been received from Myanmar for 2008 or 2009.

Although the species was considered less desirable than other *Hippocampus* spp., its use was considered to be increasing, due to higher demand for traditional medicine (A. M. Maung, *in litt.* to UNEP-WCMC, 2011). The CITES Management Authority of Myanmar did not find any internal trade but noted that a survey of illegal trade is required (A. M. Maung, *in litt.* to UNEP-WCMC, 2011).

Management: Legal protection of the species and regulation of harvest were reported to be absent (A. M. Maung, *in litt.* to UNEP-WCMC, 2011).

PHILIPPINES

Distribution in range State: The species was reported to occur in the Danajon Bank, off the island of Bohol (Martin-Smith *et al.,* 2004; Lourie *et al.,* 2005), Dumaran (Palawan province), Cavite (Luzon Island), Cawangan [presumably Cawayan] (Masbate Island) and Cebu province (Bantayan Island, Panitugan Island) (Lourie *et al.,* 2005).

Population trends and status: The proportion of *Hippocampus* spp. catch accounted for by *H. spinosissimus* was considered to be relatively small in the central Philippines (pers. obs. Project Seahorse, 2003b). Declines of 50-95 per cent of *Hippocampus* spp. were reported by fishers in the Philippines between 1980 and 1997 (Pajaro, unpublished data, cited in Project Seahorse, 2003a) and targeted catches of *H. spinosissimus* showed declines of more than 80 per cent within two months (Panes and Giles, 2004, cited in Morgan and Panes, 2008).

A previously undocumented population of *H. spinosissimus* declined by more than 90 per cent between its discovery in May and surveys in October, due to exploitation by compressor divers (Martin-Smith *et al.,* 2004).

Threats: *Hippocampus* spp. was considered to be vulnerable due to trade for traditional medicine, curios and aquaria (Vincent, 1996), with annual *Hippocampus* spp. by-catch in the Philippines estimated at two to six million specimens (Pajaro, unpubl. data, cited in Vincent *et al.,* 2011). Habitat destruction was considered a threat to *Hippocampus* spp. (Vincent, 1996)

H. spinosissimus was reported to be threatened by destructive fishing methods, including through the use of dynamite and cyanide (Project Seahorse, 2003b). In the Philippines, *H. spinosissimus* was reported to be collected using SSBA (surface-supply breathing apparatus), enabling the collection of specimens at greater depths (Martin-Smith *et al.,* 2004) and catches in 2003 were considered significant (S. Morgan & D. McCorry pers. comm., cited in Martin-Smith *et al.,* 2004).

Trade: According to data in the CITES Trade Database, no trade from the Philippines was reported 2004-2010. Annual reports from the country have not been received for 2008 or 2010.

Prior to the listing of *Hippocampus* spp. in CITES Appendix II, the Philippines was considered a major exporter of seahorses (Project Seahorse *in litt.* to UNEP-WCMC, 2011). Vincent (1996) estimated annual exports of dried *Hippocampus* spp. from the Philippines at 3.5- 11 tonnes (1.5-4.7 million specimens) and those of live specimens at more than 0.5 million specimens. Three areas, Palawan (including Busuanga), the central Visayas (including Bohol, Cebu and Negros) and Mindanao (including Sulu and Tawi Tawi in the southern Philippines) were reported to be the main sources of specimens (Vincent, 1996).

Management: Fishing, taking and trade of any species included in the CITES Appendices is prohibited in the Philippines, as per Section 97 of the Fisheries Code (Philippines, 1998; E. Alesna, pers. comm. to UNEP-WCMC, 2011). However, illegal fishing was reported to continue, due to lack of enforcement and alternative sources of income (O'Donnell *et al.,* 2010). The CITES Management Authority of the Philippines noted that no species-specific monitoring was being conducted (E. Alesna, pers. comm. to UNEP-WCMC, 2011).

A facility established in Handumon, central Philippines, was reported to be breeding *Hippocampus* spp. in captivity (Vincent, 1996).

SINGAPORE

Distribution in range State: *H. spinosissimus* was reported from the Straits of Johor (Choo and Liew, 2003). Specimens of the species have also been collected from Tanjong Katong and Siglap [southern Singapore] in 1906 and 1934 (F. K. Lye, pers. comm. to UNEP-WCMC, 2011).

Population trends and status: The species was reported to be known only from 19 specimens collected in the early 1900s, but it was not known whether the species was rare or extinct (F. K. Lye, pers. comm. to UNEP-WCMC, 2011). It was thought that surveys of deeper waters of the Singapore Straits could lead to the rediscovery of *H. spinosissimus* (F. K. Lye, pers. comm. to UNEP-WCMC, 2011). The species was not included in the 2008 Red Data Book (Ng *et al.,* 2008).

Threats: Habitat loss due to coastal development was considered to be the biggest threat to *Hippocampus* spp. in Singapore (F. K. Lye, pers. comm. to UNEP-WCMC, 2011). Over the period 1998-2001, some traders were reported to have sourced their stock locally (Project Seahorse *in litt.* to UNEP-WCMC, 2011).

Trade: According to data in the CITES Trade Database, no trade from Singapore was reported 2004-2010. Annual reports have been received from Singapore for every year during this period.

Singapore was reported to have been both an importer and exporter of *Hippocampus* spp.; large quantities were offered for sale within the country and traders estimated imports of dried specimens amounted to more than three tonnes in 1994 (Vincent, 1996).

The CITES Scientific Authority of Singapore (F. K. Lye, pers. comm. to UNEP-WCMC, 2011) noted that a total of 277 *Hippocampus* spp., originating in Indonesia and China, had been found in illegal trade 2008-2010 (F. K. Lye, in litt. to UNEP-WCMC, 2011).

Management: Section 5 of the Wild Animals and Birds Act prohibits the killing, taking or keeping of any wild animal or bird without a licence (Singapore, 1965b), however, such licences were reported to not have been issued "for many years" (Heng, 2007). The Endangered Species Act 2006 prohibits the trade in endangered animals without a permit

(Singapore, 2006; F. K. Lye, *in litt.* to UNEP-WCMC, 2011). The Fisheries Act prohibits the use of explosives, poison or trawl nets to trap fish (Singapore, 1970).

The CITES Scientific Authority of Singapore (F. K. Lye, pers. comm. to UNEP-WCMC, 2011) confirmed that no CITES permits for locally sourced *Hippocampus* spp. had been issued, that harvest of *Hippocampus* spp. was not taking place for commercial trade and therefore non-detriment findings were not being made.

The CITES Scientific Authority of Singapore (F. K. Lye, pers. comm. to UNEP-WCMC, 2011) noted that *Hippocampus* spp. were being successfully bred in captivity in Singapore.

SRI LANKA

Distribution in range State: The species' occurrence in Sri Lanka was confirmed by Lourie *et al.* (1999a), where it was found in Puttalam lagoon, between Chilaw and Kalpitiya (west coast) and along the southern and eastern coast of Sri Lanka (N. Perera, *in litt.* to UNEP-WCMC, 2011). The species was thought to possibly occur along the northwestern and northern coastal region, based on the suitability of the habitats (N. Perera, *in litt.* to UNEP-WCMC, 2011).

Population trends and status: *H. spinosissimus* was considered not to be very abundant in Sri Lanka and although relatively common in Puttalam lagoon (14 per cent of all *Hippocampus* spp. recorded, n_{total}=239), it was thought to be rare in southern and eastern coastal waters (N. Perera, *in litt.* to UNEP-WCMC, 2011).

In eelgrass (*Zostera* spp.) habitats, densities of between six and eight *Hippocampus* specimens per square metre were reported in 1989 (Pathirana, *in litt.*, 1989, cited in Vincent, 1996). Perera (*in litt.* to UNEP-WCMC, 2011) observed *H. spinosissimus* densities of few than 0.002 specimen/m^2 in shallow seagrass habitats in Puttalam lagoon. The average height of *H. spinosissimus* found was 6.68 cm, which was smaller than the average size published, with females dominating the sample (around 60 per cent) (N. Perera, *in litt.* to UNEP-WCMC, 2011).

The species was included in the Sri Lanka Red List under its global threat status, Vulnerable (IUCN Sri Lanka and the Ministry of Environment and Natural Resources, 2007).

Threats: Although no fisheries were reported to directly target *Hippocampus* spp., *H. spinosissimus* was found in by-catch, whereby even the low numbers caught were thought to possibly have a significant impact, due to the low population densities observed (N. Perera, *in litt.* to UNEP-WCMC, 2011).

Trade: According to data in the CITES Trade Database, no trade from Sri Lanka was reported 2004-2010. Annual reports have not been received from Sri Lanka for 2008 or 2010.

Hippocampus spp. was reported to have been collected and exported for the live aquarium trade until 2004, with specimens sourced from by-catch in Puttalam lagoon; specimens identified as *H. histrix* in trade were thought to possibly represent *H. spinosissimus* (N. Perera, *in litt.* to UNEP-WCMC, 2011).

Local trade levels in *H. spinosissimus* were considered to be insignificant and small numbers of *Hippocampus* spp. were reported to be used locally for traditional medicine (N. Perera, *in litt.* to UNEP-WCMC, Perera, 2011). The species had been observed in illegal trade, originating from India (N. Perera, *in litt.* to UNEP-WCMC, 2011).

Management: The Fisheries and Aquatic Resources Act prohibits the use of poison, explosives or stupefying substances to take fish (Sri Lanka, 1996). Although *Hippocampus* spp. are not legally protected (N. Perera, pers. comm. to S. Foster, 2011), CITES

permits are no longer issued for international trade in wild specimens (N. Perera, *in litt.* to UNEP-WCMC, 2011).

THAILAND

Distribution in range State: The species was reported to occur in the Andaman Sea and the Gulf of Thailand, with reports from Laem Sing and Chanthaburi, in eastern Thailand (Lourie *et al.,* 2005). *H. spinosissimus* was reported to occur in mangroves (Y. Getpech, *in litt.* to UNEP-WCMC, 2011).

Population trends and status: *H. spinosissimus* appeared to be one of the more commonly caught species in both the Andaman Sea and the Gulf of Thailand (Y. Getpech, *in litt.* to UNEP-WCMC, 2011). However the species was categorised as Vulnerable in the Thai Red Data Book 2005 (Vidthayanon, 2005) and the abundance of *Hippocampus* spp. was reported to have declined (Perry *et al.,* 2010).

Threats: The CITES Management Authority of Thailand (Y. Getpech, *in litt.* to UNEP-WCMC, 2011) considered *Hippocampus* spp. to be threatened by habitat change, by-catch, invasive species and trade for traditional medicine. Seahorse harvest was reported to be mostly from by-catch and the genus was not targeted directly (Y. Getpech, *in litt.* to UNEP-WCMC, 2011).

Overfishing was considered to be the main cause of observed population declines (Vincent, 1996), with annual *Hippocampus* spp. by-catch reported to consist of 2.1 million specimens (Anon., 2001, cited in Perry *et al.,* 2010). Furthermore, fishing for *Hippocampus* spp. was reported to generally occur during the non-monsoon season from October to February, which was thought to be the breeding season for many species (Vincent, 1996).

Trade: According to the CITES Trade Database, trade in *H. spinosissimus* originating in Thailand 2004-2010 consisted exclusively of wild-sourced bodies traded for commercial purposes (Table 1). Direct exports reported by Thailand notably exceeded trade reported by importers (possibly because Thailand reported on permits issued rather than actual trade), with 30 900 kg reported exported and 18 351 kg reported imported over this period. Both exporter- and importer-reported trade decreased between 2005 and 2008, with importer-reported trade increasing slightly in 2009.

Table 1. Direct exports of *Hippocampus spinosissimus* from Thailand, 2004-2010 (with quantities rounded to the nearest tenth of a kg, where applicable). All trade was in wild-sourced bodies. The species was listed in Appendix II on 15/05/2004. (No trade was reported in 2010.)

Units	Reported by	2004	2005	2006	2007	2008	2009	Total
kg	Exporter	4507.0	7767.5	5807.0	5556.0	4170.8	3092.1	30900.4
	Importer	2082.8	4056.3	3142.7	3432.9	2763.1	2873.1	18351.0
-	Exporter							
	Importer			100				100

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Re-exports of *H. spinosissimus* originating in Thailand reported between 2004 and 2010 comprised 82.3 kg of bodies reportedly imported by Canada in 2008 and 2009 (not confirmed by the re-exporter) and 32 kg of bodies reportedly re-exported by Singapore to Hong Kong SAR in 2009 (trade reported by both trading partners). All re-exports were reported as wild-sourced and for commercial purposes. Annual reports from Thailand have been received for all years except 2010.

Within Thailand, *H. spinosissimus* was reported to be traded for traditional medicine, live and as curios (Perry *et al.,* 2010).

Management: The Export and Import of Goods Act, 1979 was reported to prohibit the export of live *Hippocampus* spp. caught in Thai waters (Y. Getpech, *in litt.* to UNEP-WCMC, 2011) since 1988, but illegal exports were thought to have continued (Perry *et al.,* 2010). Further information on the Notifications under the Thai Fishery Law and other management measures, as provided by the Thai Management Authority (Y. Getpech, *in litt.* to UNEP-WCMC, 2011), can be found in the management section for Thailand in the review of *H. kelloggi*.

One facility was reported to be breeding *H. kuda* in captivity in 1998 (Koldewey and Martin-Smith, 2010).

VIET NAM

Distribution in range State: The CITES Management Authority of Viet Nam (T. M. Vuong, *in litt.* to UNEP-WCMC, 2011) confirmed that the species' distribution ranged from Quang Ninh, Hai Phong, Da Nang to Kien Giang province. The species was confirmed from Binh Thuan province [south east] (Truong Si Ky, pers. comm., cited in Lourie *et al.,* 1999b); the inferred distribution of the species was reported to include Quang Ninh province [north], the cities of Hai Phong [north] and Da Nang [central] and from Khanh Hoa province [south central] to Kien Giang province [south western coast] (Lourie *et al.,* 1999b).

Population trends and status: The status of *Hippocampus* populations in Viet Nam was considered to be poorly known (Giles *et al.,* 2006). In the late 1990s, *H. spinosissimus* was considered to be particularly common and widespread in Viet Nam (Lourie *et al.,* 1999b). The CITES MA of Viet Nam (T. M. Vuong, *in litt.* to UNEP-WCMC, 2011) reported that the species was widely abundant, although the population was declining.

The species was reported to be one of the two most commonly trawled *Hippocampus* species (Giles *et al.,* 2006), with numbers caught considered significant (Meeuwig *et al.,* 2006), although this may be because the species' preferred habitat is subject to more intense trawling (Meeuwig *et al.,* 2006). Observed by-catch in landings of the Cua Be fishing fleet (Central Coast) between 1996 and 2000, consisted of 34 per cent *H. spinosissimus;* this area was reported to be a major source for *Hippocampus* specimens (Meeuwig *et al.,* 2006). *H. spinosissimus* comprised 56 per cent of the catch in Binhthuan province (Truong Si Ky, pers. comm., cited in Lourie *et al.,* 1999b).

Landings of *Hippocampus* spp. in Viet Nam showed geographic variations, with fewer caught in the north of Viet Nam than in the south, although it was unclear whether this was due to variations in abundance or fishing method used (Giles *et al.,* 2006).

As *Hippocampus* spp. in Viet Nam were reported to be mainly obtained through by-catch, declines in numbers were thought to reflect general fish declines (Vincent, 1996). Surveyed fishers and buyers were reported to have noted declines in *Hippocampus* spp. catches (Giles *et al.,* 2006). However, while a large decrease in the proportion of *H. spinosissimus* in by-catch had been observed between 1998 and 2000, changes in CPUE (catch per unit effort) were not considered to be unidirectional over the years (1996 to 2000) and no significant changes in the size of *H. spinosissimus* were found (Meeuwig *et al.,* 2006). Meeuwig *et al.* (2006) noted that the expansion of the Vietnamese trawl fleet may explain reports of significant declines in *Hippocampus* spp. catch.

H. spinosissimus was not included in the 2007 Viet Nam Red Data Book (Institute for Science and Technology of Vietnam, 2007; T. M. Vuong, *in litt.* to UNEP-WCMC, 2011); however Giles *et al.* (2006) noted that in the 1992 edition the classification of *H. histrix* as Vulnerable may in fact represent this species. The species was not included in the list of endangered species published by the Ministry of Agriculture in Decision Number 82/2008/QD-BNN

(T. M. Vuong, pers. comm. to CITES Secretariat, 2011).

Threats: The CITES MA of Viet Nam (T. M. Vuong, *in litt.* to UNEP-WCMC, 2011) listed habitat destruction, pollution and climate changes as major threats, with by-catch and localised over-harvest also being considered major threats.

Non-selective trawling was considered to pose the greatest threat to *Hippocampus* spp. in Viet Nam. *H. spinosissimus* was noted to be one of the most widely encountered species in trade (Giles *et al*., 2006). The majority of *Hippocampus* spp. was thought to be sourced from trawl by-catch, which was estimated at about 6.5 tonnes (2.3 million specimens) annually over five coastal provinces (Giles *et al.,* 2006).

Hippocampus spp. were also reported to be collected via compressor diving (K.S. Truong pers. comm., undated, cited in Morgan and Panes, 2008), however only in small numbers and mainly *H. kuda* (Giles *et al.,* 2006).

Vincent (1996) considered the destruction of habitat a possibly larger threat than trade.

Trade: According to data in the CITES Trade Database, trade from Viet Nam 2004-2010 consisted entirely of wild-sourced live specimens directly exported to the United States for commercial purposes. Viet Nam reported the export of 1377 kg of live specimens in 2005, with the United States reporting the import of 1164 kg in 2005 and a further 220 kg in 2006. All annual reports have been received from Viet Nam for this period.

Viet Nam was reported to be one of the top five producers of dried *Hippocampus* spp. (Project Seahorse, unpubl. data, cited in Giles *et al.,* 2006) and *H. spinosissimus* was reported to be amongst the species most widely encountered in trade (Giles *et al.,* 2006). Vincent (1996) estimated the annual exports of dried *Hippocampus* spp. from Viet Nam to be five tonnes. While internal trade was reported to occur (CoP12 Prop. 37), the majority of specimens were reported to be exported to China, "generally through unofficial and unregulated channels" (Giles *et al.,* 2006). However, information on the nature and size of the trade was considered insufficient (Giles *et al.,* 2006).

Management: The CITES MA of Viet Nam (T.M. Vuong, *in litt.* to UNEP-WCMC, 2011) noted that non-detriment findings had not been conducted and that no species specific monitoring program was in place other than those on the monitoring of biodiversity in general. Harvest of *Hippocampus* spp. within the core zones of the five Marine Protected Areas was reported to be prohibited, with plans to increase the number of MPA's existing (T. M. Vuong, *in litt.* to UNEP-WCMC, 2011).

H. spinosissimus was reported to be successfully bred in captivity in Viet Nam, with breeding farms considered to be in line with Conf. Res. 10.16 by the Vietnamese CITES Scientific Authority (T. M. Vuong, pers. comm. to CITES Secretariat, 2011); export of seahorses taken from the wild is not permitted until non-detriment findings have been conducted (T.M. Vuong, pers. comm. to UNEP-WCMC, 2011).

Further information on legislation and other management measures, as provided by the Viet Nam Management Authority (T. M. Vuong, *in litt.* to UNEP-WCMC, 2011), can be found in the management section for Viet Nam in the review of *H. kelloggi*.

D. Problems identified that are not related to the implementation of Article IV, paragraphs 2 (a), 3 or 6 (a)

By-catch was reported as a main threat. Illegal trade was reported to be occurring in Cambodia, the People's Republic of China, Singapore, Sri Lanka, Thailand and Viet Nam. Trade in *Hippocampus* spp. has been reported at the genus level, making the monitoring of trade in individual species difficult. Furthermore, the mixed reporting of units (specimens and weight (kg)) makes it difficult to estimate the total number of specimens in international trade.

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Pandinus imperator (Koch, 1842): Benin, Côte d'Ivoire, Ghana, Guinea, Liberia, Nigeria, Togo

Scorpionidae, Emperor Scorpion.

Selection for Review of Significant Trade

Pandinus imperator was discussed at the 23rd meeting of the Animals Committee (AC23), on the basis of trade data provided in document AC23 Doc. 8.5. The inclusion of the species in the Review of Significant Trade, however, was postponed due to the fact that a report on the trade in this species was promised to be published shortly. Since this report was still not available at the 24th meeting of the Animals Committee (AC24), the species was included then in the Review of Significant Trade as an urgent case (AC24 Summary Record). At the 25th Animals Committee, the working group decided to retain Benin, Cote d'Ivoire, Ghana, Guinea, Liberia, Nigeria, and Togo in the Review of Significant Trade.

A. Summary

Overview of *Pandinus imperator* recommendations.

Range State	Provisional category	Summary
Benin	Urgent Concern	Conservation status unclear, considered abundant by exporters but reported to be threatened by overcollection by some authors. Possibly erroneous use of source codes and one author expressing doubts that either captive breeding or ranching are properly developed in the country. Relatively high levels of trade from the country, mainly in ranched specimens. The establishment of quotas (e.g. 7000 ranched specimens in each of 2010 and 2011) does not appear to take into account the status of the species, and available information indicates that exports are occurring without a scientifically based non detriment finding, therefore categorised as Urgent Concern.
Côte d'Ivoire	Least Concern	Apparently widespread in Côte d'Ivoire, but status not known. No international trade reported since 2003, therefore on the basis of no anticipated international trade, categorised as Least Concern.
Ghana	Urgent Concern	Status not known although considered abundant by exporters. Very high levels of trade reported (103 065 and 74 235 wild specimens in 2009 and 2010 respectively). No management measures known, no information on the basis for non-detriment findings provided and impact of high trade levels unknown, therefore categorised as Urgent Concern.
Guinea	Possible Concern	Status not known. Low levels of trade from the country, with 815 wild-sourced live specimens reported by the exporter 2000-2010. While the impact of current international trade levels is likely to be small, no information was available on the implementation of Article IV and therefore categorised as Possible Concern.
Liberia	Least Concern	Status not known. However, no international trade in the species reported 2000-2010, therefore on the basis of no anticipated international trade, categorised as Least Concern.
Nigeria	Least Concern	Common in the late 1960s, particularly in the lowland rainforest zone, but no recent information on the status of the species. No direct trade from Nigeria reported 2000-2010, low level re-exports and seizures reported but none since 2005. On the basis of no anticipated international trade, categorised as Least Concern.

Range State	Provisional category	Summary
Togo	Urgent Concern	Status in Togo unclear, but apparently common. High levels of trade in ranched and wild-sourced specimens from the country. The establishment of quotas (e.g. 1000 wild specimens and 16 500 ranched specimens in each of 2010 and 2011) does not appear to take into account the status of the species and, based on importer data, they appear to have been consistently exceeded. No management measures known and impact of trade levels unknown. Available information indicates that exports are occurring without a scientifically based non detriment finding, therefore categorised as Urgent Concern.

B. Species overview

Taxonomic note: The genus *Pandinus* was reported to include 24 species and two subspecies (Prendini *et al.,* 2003). Distinguishing *Pandinus* species was considered to be "extraordinarily difficult even for an expert" (CoP9 Prop. 64). *P. gambiensis* and *P. dictator* were considered to be similar large *Pandinus* species from west Africa, with reliable identification only being possible by their patterns of tarsan spines and trichobothrial hairs on their pincers or chelae (CoP9 Prop. 64). Lourenço and Cloudsley-Thompson (1996) provided the following distinguishing characteristics for *P. imperator*: "has more than 26 trichobothria on the chela. Three of these trichobothria are present on the internal surface of the chela at the base of the fixed finger, dispersed in a straight line and equal distance apart. Ventral surface of the tibia with more than 30 trichobothria." In 2003, Lourenço & Cloudsley-Thompson (1996) was adopted as the CITES standard reference for scorpions of the genus *Pandinus*.

Biology: *Pandinus imperator* is a large scorpion that reaches lengths of up to 18 to 20 cm and can exceed 60g in weight (Polis, 1990; Brownell and Polis, 2001). It was reported to occur in tropical west Africa and to inhabit in woodland, savannah and rainforest habitats (CoP9 Prop. 64; Toye, 1970; Casper, 1985; Mahsberg, 1990; Prendini, 2004).

It was reported to live colonially, in groups of up to 15 or 20 individuals, in burrows under termite mounds and under stones or logs (CoP9 Prop. 64; Mahsberg, 1990; Lourenco and Cloudsley-Thompson, 1999; Prendini *et al.,* 2003; Prendini, 2004; Ineich, 2006) and to be mainly diurnal (Toye, 1970; Hadley, 1974; Prendini, 2004).

Reproduction in scorpions was reported to involve a ritualized and complex courtship, followed by the male depositing a spermatophore, from which the female receives a sperm packet (Polis, 1990). Once fertilization is accomplished, embryos reportedly undergo a viviparous development and, once born, the young climb onto the mother's back to continue development and moult for the first time (Polis, 1990). According to Brownell and Polis (2001), the time from insemination to birth was typically around one year but can be up to around three years. Lourenço (2000) gave an average embryonic development time of seven months. Litter sizes of 19 (Brownell and Polis, 2001) and 32 (Larrouy *et al.* (1973, cited in Polis, 1990; Lourenço, 2000) have been reported. Ineich (2006) noted that exporters in Togo reported a production of 5 to 42 juveniles per female, with an average of 20. Mahsberg (1990) highlighted the importance of family cohesion to the survival of the young and considered the species to be an "intermediate subsocial scorpion".

Age to maturity was reported to be at least 2.5 years and the species longevity was reported to be more than 10 years (Brownell and Polis, 2001). Ineich (2006) stated that in captivity, sexual maturity could be achieved in one year, that captive-bred specimens reach a marketable size at the age of 8 to 10 months and that the adult size is reached at around three years of age.

Polis (1990) noted that several scorpion species do not follow the r-selection life strategy typical of terrestrial invertebrates, resembling instead long-lived vertebrates in several aspects of their life history (i.e. K-selection strategy), "probably because of the stability and predictability of their subterranean habitat".

General distribution and status: Reported to occur in Benin, Côte d'Ivoire, Ghana, Guinea, Liberia, Togo and Nigeria (Lourenço and Cloudsley-Thompson, 1996). Apparent records of the species from Bioko (Equatorial Guinea), Ethiopia, Somalia and Senegal reported by Lamoral and Reynders (1975) were considered to be probably based on misidentification or confusion with other *Pandinus* species (Lourenço and Cloudsley-Thompson, 1996).

Lourenço and Cloudsley-Thompson (1996) noted that "little research has been carried out on *Pandinus* spp." More recently, Prendini (pers. comm. To UNEP-WCMC, 2011) stated: "very little is known about the conservation status of the species but I am sure it is in a bad state".

Wild populations were considered to be threatened by the exotic pet trade and by habitat destruction through deforestation (Prendini *et al.*, 2003; Prendini, 2004). *P. imperator* was considered to be highly vulnerable to over-collecting for the pet trade as a result of its life strategy, i.e. highly social animals with small brood sizes, lengthy gestation periods and age to sexual maturity, parental care, and generally low reproductive output (CoP9 Prop. 64; Sissom, 1994; Prendini *et al.*, 2003; Lourenço, 2004). The species usually lives in groups under termite mounds which was considered to make these colonies easy to locate and to facilitate capture of several individuals at once (CoP9 Prop. 64; Ineich, 2006).

Ineich (2006) noted that the only scorpion species exported from west Africa was *Pandinus imperator*, and that it was exported "in huge quantities". Prendini (2004) noted that "this species is readily obtained from pet stores in Europe, the USA and Japan". The species was considered to be in decline, at least locally, as a result of the heavy international trade in the species (CoP9 Prop. 64).

P. imperator was reported to be relatively easy to rear (CoP9 Prop. 64; Sissom, 1994; Brownell and Polis, 2001; Ineich, 2006; Taylor, 2010) and breed (CoP9 Prop. 64; Ineich, 2006; Taylor, 2010). One hobbyist (Taylor, 2010) noted, however, that "it is widely accepted and acknowledged that most of the Emperors *Pandinus imperator* in captivity today are wild caught imports".

Prendini *et al*. (2003) and Prendini (2004) suggested that the decline in the species may be partially alleviated by its listing in CITES Appendix II and "the increasing preference for captive-bred specimens in the pet trade".

Overview of trade and management in the species: *P. imperator* was listed in CITES Appendix II on 16/02/1995, following CoP9 (CoP9 Prop. 64).

At the 15th meeting of the Animals Committee, the working group that reviewed all taxa in the Review of Significant Trade process expressed concerns about claims that the species was ranched and about the lack of protection or management of the species throughout its range particularly in the exporting countries (AC15 Proceedings). The species was reviewed for AC 15, when it was concluded that its status in the main exporting countries (Ghana, Togo and Benin) was "completely unknown" and that it required "further investigation" (WCMC *et al.*, 1999)

Ivan Ineich (French National Natural History Museum) undertook two missions, one in 2004 to Benin and Togo and another in 2006 to Ghana and Togo to assess the captive breeding, ranching and trade of reptiles and *P. imperator* from those countries and prepared a report for the CITES Secretariat based on his findings (Ineich, 2006).

At the 23rd meeting of the Animals Committee in 2008, regarding the selection of species for trade reviews following CoP14, it was decided that *P. imperator* would not be retained in the Review of Significant Trade process, but the Secretariat was requested to make available to the AC the report on the mission carried out by the French National Natural History Museum (AC23 Summary Record). The report was still not available at the 24th meeting of the Animals Committee due to ongoing discussions with the range States concerned and the Committee decided to include the species in the Review of Significant Trade. The report was eventually made available as an AC25 information document (Ineich, 2006; AC24 Doc. 7.4; AC25 Doc. 9.5).

C. Country review

BENIN

Distribution in range State: Occurrence in Benin reported by Lourenço and Cloudsley-Thompson (1996), Prendini (2004), Ineich (2006), Vignoli *et al.* (2006) and Vignoli and Prendini (2008). The map in Lourenço and Cloudsley-Thompson (1996) suggested its distribution is confined to the southern half of the country, while the map in Prendini (2004) suggested a wider distribution throughout the country. Vignoli and Prendini (2008) reported the species from the Department of Atakora, in the north-west of Benin.

Population trends and status: Ineich (2006) noted that exporters considered the species to be very abundant in Benin.

Threats: Ineich (2006) expressed concerns regarding the sustainability of the trade from Benin. No additional information appears to be available on specific threats to the species in the country.

Trade: According to data in the CITES Trade Database, trade reported by Benin between 2000 and 2010 consisted of 76 700 live, ranched specimens exported for commercial purposes (Table 1). Exports reported by Benin decreased over this period from 22 140 live, ranched individuals in 2000 to 1425 individuals in 2010. No annual reports have been received from Benin for 2003 or 2006. Importers reported lower volumes of trade in ranched specimens from Benin over the same period (58 232 live, ranched individuals). The import of 16 002 live, wild-sourced specimens and 780 captive-bred specimens was also reported by importers, but this trade was not confirmed by Benin (Table 1). Seizures and confiscations were reported by the United Kingdom (999 live specimens) and the United States (three live specimens), but no seizures have been reported since 2004.

Benin published export quotas for ranched *P. imperator* in every year 2000-2011; trade in ranched specimens appears to have remained within the quotas in all years (Table 2). A quota of 1000 wild-sourced specimens was published in 2010 and 2011; there has been no wild-sourced direct trade from Benin reported since 2006.

Indirect trade in *P. imperator* reported between 2000 and 2010 principally comprised live, ranched specimens traded for commercial purposes, with 4627 specimens reported re-exported and 3788 specimens reported imported. No indirect trade in ranched specimens has been recorded since 2008 though re-exports of live wild-sourced specimens were reported by the United States (515 and 25 specimens in 2007 and 2009, respectively); this trade was not confirmed by the importers.

Management: Reported to be 'produced' by captive breeding in Benin by exporters in the country (Ineich, 2006), although Ineich (2006) considered this would not be possible in view of the facilities he observed during his visit to the country in 2004. The scorpions were held

in outdoor enclosures covered with vegetation and surrounded by a cement wall, and experienced high mortality levels (Ineich, 2006).

During his 2004 visit to Benin, Ineich (2006) expressed concerns about the erroneous use of source codes. He considered that while ranching was possible and desirable in the country, there remained a lot of work to do to train both exporters and local CITES authorities in this regard. The author also noted that he could not evaluate any subsequent progress as he was unable to visit again in 2006 (Ineich, 2006)

Ineich (2006) stated further: "In Benin, quotas are fixed on an empirical basis by the CITES authorities by combining the production capacities of all facilities (according to the number of breeding females) and the potential trade needs and adding 20 per cent for the fraction of juveniles having to be released back into the wild (ranching) and 10 per cent for egg and juvenile mortality. Those quotas are then distributed amongst exporters according to their breeding stock. No reliable scientific information is available for the CITES-listed species traded from Benin; considerable work remains to be done and the country will never succeed without outside help. We can therefore be concerned about the significant 2006 quota increases made by this country." Ineich (2006) also noted that exporters in Benin recognised that the quotas from the country were excessive and should be reduced and adjusted to the reality of the trade.

Ineich (2006) considered that Benin could not guarantee the sustainability of the trade in scorpions and that the situation in the country did not show signs of improvement. Consequently, Ineich (2006) recommended that a ranching system similar to that in Togo should be established.

CÔTE D'IVOIRE

Distribution in range State: Occurrence in Côte d'Ivoire reported by Lourenço and Cloudsley-Thompson (1996; 1999), Kovarik (2002), Prendini (2004) and The CITES Management Authority of Côte d'Ivoire (J. Zouzou pers. comm. to UNEP-WCMC, 2011). The maps in Lourenço and Cloudsley-Thompson (1996) and Prendini (2004) indicated that its range extends throughout the country, except the northern-most areas.

Reported to occur in the Lamto ecological station, central-southern Côte d'Ivoire (Lourenço, 1986; Lourenco and Cloudsley-Thompson, 1999) and in Banco forest (Lourenco and Cloudsley-Thompson, 1999).

Population trends and status: The species was found under logs and dead trees in Banco forest, where females were a mean length of 7.6 cm and produced a mean of 35 offspring. They were also found under dead "Rônier" palms in the Lamto savanna where mean length of females was 5.8 cm and the mean number of offspring was 15 (Lourenco and Cloudsley-Thompson, 1999). The CITES Management Authority of Côte d'Ivoire indicated that no data were available for *P. imperator* in the country (J. Zouzou pers. comm. to UNEP-WCMC, 2011).

Table 1. Direct exports of *Pandinus imperator* from Benin, 2000-2010.

Term	Source	Purpose	Reported by	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
live	W	T	Exporter												
			Importer	4300	3826	6276	1400			200					16002
	R	T	Exporter	22140	12080	7645		8260	7800		9500	5900	1950	1425	76700
			Importer	6000	6549	4474	5288	7205	6104	10677	5805	4165	1965		58232
	C	T	Exporter												
			Importer		630						100	50			780
	I	T	Exporter												
			Importer		3										3
		-	Exporter												
			Importer			699		300							999
bodies	W	S	Exporter												
			Importer			1									1

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Table 2. CITES export quotas for ranched *Pandinus imperator* from Benin, and associated global direct trade in live, ranched individuals as reported by Benin and the importing countries, 2000-2011 (trade data not yet available for 2011; Benin has not yet submitted annual reports for 2003 or 2006).

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Quota	25000	42781	22000	16000	16000	10000	15000	10000	10000	10000	7000	7000
Reported by Exporter	22140	12080	7645		8260	7800		9500	5900	1950	1425	-
Reported by Importer	6000	6549	4474	5288	7205	6104	10677	5805	4165	1965		-

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Threats: No information was located.

Trade: According to data in the CITES Trade Database, the only reported trade originating in Côte d'Ivoire between 2000 and 2010 was the re-export of one pre-Convention body from Germany to the United States in 2003 for commercial purposes. Côte d'Ivoire's annual reports for 2006 and 2010 have not yet been received.

The CITES MA of Côte d'Ivoire indicated that the species was not subject to significant trade from the country (J. Zouzou pers. comm. to UNEP-WCMC, 2011).

Management: No information was located.

GHANA

Distribution in range State: Occurrence in Ghana reported by Lourenço and Cloudsley-Thompson (1996), Kovarik (1997), Prendini *et al.* (2003), Prendini (2004) and Ineich (2006). The maps in Lourenço and Cloudsley-Thompson (1996) and Prendini (2004) suggested it is distributed in the southern parts of the country.

Population trends and status: Ineich (2006) noted that exporters considered the species to be very abundant in Ghana.

Threats: No information was located.

Trade: According to data in the CITES Trade Database, trade in *P. imperator* reported by Ghana 2000-2010, consisted almost entirely of wild-sourced, live specimens traded for commercial purposes (Table 3). Ghana has not reported exports of ranched specimens since 2005.

Trade reported by importers (766 244 live, wild-sourced specimens and 2800 live, ranched specimens) was higher than trade reported by Ghana. The seizure or confiscation of live specimens was reported by the United Kingdom in 2000 and 2001 and by the United States in 2002 and 2008. With the exception of 2006, all annual reports have been received from Ghana for the period 2000-2010.

Indirect trade in *P. imperator* originating in Ghana 2000-2010 primarily comprised live, wild-sourced specimens traded for commercial purposes, with 51 130 reported by re-exporters and 68 006 reported by importers over this period. The re-export of 1012 live, ranched individuals and 175 live, captive-bred individuals were also reported by re-exporters, with importers reporting smaller quantities.

Management: Reported to be collected from the wild in Ghana (Ineich, 2006), where exporters considered that captive-breeding or ranching the species would not be cost-effective (Ineich, 2006).

Ineich (2006) reported that the facilities Grey Head Enterprise and Safari Pet Supply exported wild-sourced *P. imperator* specimens.

Table 3. Direct exports of live *Pandinus imperator* from Ghana, 2000-2010.

Source	Purpose	Reported by	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
W	T	Exporter	62130	29250	105657	94750	72780	107723		59014	2250	103065	74235	710854
		Importer	39311	62200	85939	71497	70078	79149	74456	96974	101495	83345	1800	766244
	B	Exporter												
		Importer			10									10
R	T	Exporter					300	200						500
		Importer	50		800	1150	300			100	400			2800
C	T	Exporter												
		Importer										300		300
I	T	Exporter												
		Importer			20						1000			1020
	-	Exporter												
		Importer	200	114										314

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

GUINEA

Distribution in range State: Occurrence in Guinea reported by Lourenço and Cloudsley-Thompson (1996) and Prendini (2004). The maps in Lourenço and Cloudsley-Thompson (1996) and Prendini (2004) suggested that it is distributed in the south-eastern corner of the country.

Population trends and status: No information was located.

Threats: No information was located.

Trade: According to data in the CITES Trade Database, trade originating in Guinea 2000-2010 consisted entirely of wild-sourced, live specimens. Direct exports reported by Guinea comprised 400 and 410 individuals exported in 2001 and 2008, respectively, for commercial purposes, and five individuals in 2008 for scientific purposes. The import of 50 individuals for commercial purposes was reported by importers in 2006. Annual reports have not yet been received from Guinea for 2007 or 2009.

Indirect trade in *P. imperator* originating in Guinea consisted of 47 individuals re-exported by the United States to Canada (not confirmed by Canada), and 30 individuals imported by Chile from the United States (not reported by the United States).

Management: No information was located.

LIBERIA

Distribution in range State: Occurrence in Liberia reported by Lourenço and Cloudsley-Thompson (1996) and Prendini (2004). The map in Lourenço and Cloudsley-Thompson (1996) suggested distribution in the eastern part of the country, while the map in Prendini (2004) also included records from south-western areas.

Population trends and status: No information was located.

Threats: No information was located.

Trade: No trade from Liberia was reported 2000-2010 according to data in the CITES Trade Database. No annual reports have been received from Liberia in 2008, 2009 and 2010.

Management: No information was located.

NIGERIA

Distribution in range State: Occurrence in Nigeria reported by Toye (1970), Lourenço and Cloudsley-Thompson (1996) and Prendini (2004). The map in Lourenço and Cloudsley-Thompson (1996) indicated it was confined to the south-western corner of the country, while Prendini (2004) considered the species' range to extend into eastern Nigeria as well. Toye (1970) reported the occurrence of the species in the Ibadan area of the lowland rain forest zone (south-west Nigeria).

Population trends and status: Based on field observation from 1968 and 1969, Toye (1970) reported that "*P. imperator* commonly occurs in the lowland rain forest. Specimens were not common in the vegetation zones north of the derived savannah. In such zones specimens have been collected only in localised areas of relic forest". Considered to be "common" in Nigeria, and "especially common in the lowland rain forest zone" (Toye, 1970). Toye (1970) noted that specimens were found under rotten wood and leaf litter, and commonly in burrows, with up to five individuals found in a single burrow.

Threats: No information was located.

Trade: No direct trade originating in Nigeria was reported 2000-2010. However, the United Kingdom reported the seizure or confiscation of 156 live specimens from Nigeria over the period 2003-2004. Annual reports for 2005 and 2010 have not yet been received.

Indirect trade in *P. imperator* originating in Nigeria 2000-2010 consisted of 150 live, ranched specimens and 100 live, wild-sourced specimens reported re-exported by the United States to Taiwan, Province of China in 2004 and 2005, respectively.

Management: No information was located.

TOGO

Distribution in range State: Occurrence in Togo reported by Lourenço and Cloudsley-Thompson (1996), Kovarik (2002) and Prendini (2004). The map in Lourenço and Cloudsley-Thompson (1996) suggested its range was confined to the southern half of the country, while Prendini (2004) suggested a wider distribution throughout the country. The CITES Management Authority of Togo (*in litt.* to UNEP-WCMC, 2011) reported the occurrence of the species throughout the country.

Population trends and status: Ineich (2006) visited a ranching site in southern Togo, which he described as a highly anthropized area of savannah and cultivated land along a 25-km stretch of road. On the basis of his observations in this site, he considered *P. imperator* concentrations to be probably high and able to withstand collection for trade in ranched specimens. Ineich (2006) estimated that in such habitat two to three collectors could collect 20 to 30 gravid females in one day in a limited area.

The CITES MA of Togo (*in litt.* to UNEP-WCMC, 2011) noted that *P. imperator* was common throughout Togo, particularly in savannah and cultivated areas.

Threats: No specific information on threats to the species in Togo was located. Ineich (2006) reported that, in Togo, the species had no local threats and that it was not collected for purposes other than ranching.

Trade: According to data within the CITES Trade Database, trade reported by Togo over the period 2000-2010 consisted of 67 960 live, ranched specimens and 2590 live, wild-sourced specimens (Table 4). In contrast, importer-reported trade was notably higher with 187 137 ranched and 145 976 wild-sourced specimens reported. Overall, importer-reported trade (all sources) was over four times the level of trade reported by Togo. No annual report has been received from Togo for 2006 or 2008-2010.

Togo published export quotas for wild-sourced and ranched specimens of *P. imperator* in every year 2000-2010. According to data reported by Togo, the quota for wild-sourced specimens was apparently exceeded in 2001 (by 240 specimens) and the quota for ranched specimens was apparently exceeded in 2007 (by 130 specimens) (Tables 5 & 6). According to importer-reported data, quotas for wild-sourced specimens were exceeded in all years 2000-2008, with quotas 2000-2005 apparently exceeded by over ten-fold (Table 5). For ranched specimens, quotas were exceeded every year between 2003 and 2008 according to importer data (Table 6). The vast majority of importer-reported trade in wild-sourced and ranched specimens was reported by the United States.

Table 4. Direct exports of *Pandinus imperator* from Togo, 2000-2010. All trade was in live specimens.

Source	Reported by	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
W	Exporter		1240	500	50		300		500				2590
	Importer	12270	31210	35510	23476	23000	16301	1300	1590	1119	200		145976
R	Exporter		12155	8680	11775	8750	12970		13630				67960
	Importer	12592	13490	6760	16225	23575	21175	31287	21790	16500	13893	9850	187137
U	Exporter												
	Importer						1800		1200				3000
C	Exporter												
	Importer		600										600
I	Exporter												
	Importer				3								3

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Table 5. CITES export quotas for wild-sourced *Pandinus imperator* originating in Togo, and associated global trade in live, wild-sourced specimens as reported by Togo and the importing countries, 2000-2010.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Quota	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Reported by Exporter		1240	500	50		300		500			
Reported by Importer	12270	31210	35510	23476	23000	16301	1300	1590	1119	200	

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Table 6. CITES export quotas for ranched *Pandinus imperator* originating in Togo, and associated global trade in live, ranched specimens as reported by Togo and the importing countries, 2000-2010. (No annual report has been received from Togo for 2006 or 2008-2010.)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Quota	13500	13500	13500	13500	13500	13500	13500	13500	13500	16500	16500
Reported by Exporter		12155	8680	11775	8750	12970		13630			
Reported by Importer	12592	13490	6760	16225	23575	21175	31287	21790	16500	13893	9850

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Indirect trade in *P. imperator* originating in Togo principally comprised ranched, live specimens traded for commercial purposes, with 19 794 specimens reported re-exported and 21 585 reported imported over the period 2000-2010. Smaller quantities of wild-sourced specimens, as well as several shipments of captive-bred specimens, were also reported: 2294 as reported by re-exporters and 4427 as reported by importers. The principal re-exporter of both ranched and wild *P. imperator* originating in Togo was the United States.

Management: Wild-sourced individuals were reported to be collected from the maritime region and from the plateau between Lomé and Atkpamé (southern third of the country), while gravid females or females with young for ranching were reported to be collected from ranching areas defined by the CITES Management Authority within the maritime region, around 30 km from Lomé (CITES MA of Togo, 2011).

The CITES MA of Togo (in litt. to UNEP-WCMC, 2011) reported that the collection of *P. imperator* was carried out under the supervision of staff from the CITES Management Authority with the help of specialist collectors, by systematically searching in holes and rotting stumps, usually during the hot hours of the day when the scorpions are sheltered. Collection was reported to take place at set times, which was considered to provide a precise picture over time of the *P. imperator* populations in the exploited areas.

The CITES MA of Togo (*in litt*. to UNEP-WCMC, 2011) reported that the species had been ranched in Togo for many years. They stated further that specimens were kept in plastic trays containing a relatively thick layer of substrate, hiding places and a shallow tray of water, and that they were fed mice or insects and sometimes minced meat or pieces of lung. In case of suspicious deaths, the remaining scorpions were isolated, the substrate removed and the trays disinfected (CITES MA of Togo, 2011).

Ineich (2006) reported that in Togo, the animals were kept with much more care than in Benin and noted that, following the recommendations he made in 2004, most exporters from Togo developed a system of small plastic boxes for each gravid female and/or its offspring. Ineich (2006) noted some confusion in one facility regarding the use of source codes W, C and R (Ineich, 2006).

Ineich (2006) considered the 2006 quota of 13 500 ranched specimens to be adequate in relation to the potential production and international demand but noted that quotas were calculated by the CITES authorities in Togo on the basis of the needs of producers and with very little input from reliable biological information.

The CITES MA of Togo (in litt. to UNEP-WCMC, 2011) reported that the country did not exceed its quotas of 1000 wild-sourced individuals and 16 500 ranched individuals and stated that that the country collects annually around 1000 pregnant females or females with young in the ranching zones during two annual collections.

The formula used to determine the quota per farm was reported to be "Q = (y x n) – t – c", i.e. quota = [20 (litter size per female) x total number of pregnant females] – 10 per cent (juvenile mortality) – 10 per cent (individuals returned to the collection site). The quotas of each farm were reported to be added up to obtain the national quota (CITES Management Authority of Togo, 2011).

The CITES MA of Togo (in litt. to UNEP-WCMC, 2011) suggested that the source W quota be maintained and that the maximum size for source R individuals be fixed at 10 cm.

D. Problems identified that are not related to the implementation of Article IV, paragraphs 2 (a), 3 or 6 (a)

None identified.

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Tridacna spp.: Solomon Islands

Tridacnidae, Giant clams.

Selection for Review of Significant Trade

At the 24th meeting of the Animals Committee, it was agreed to include *Tridacna* spp. from the Solomon Islands in the Review of Significant Trade as an urgent case (AC24 Summary Record). The Secretariat was instructed to write to the Solomon Islands, requesting a) an explanation of the information provided in 2004 which differed from published trade data, b) updated information of captive-production facilities, and c) information on any recent quantitative surveys conducted in the Solomon Islands for all six species (AC24 Summary Record). By March 2011, no response had been received from the Solomon Islands (AC25 Doc. 9.5) and, at the 25th Animals Committee, *Tridacna* spp. from the Solomon Islands was retained in the Review of Significant Trade process (AC25 Summary Record).

A. Summary

Overview of *Tridacna* spp. recommendations.

Species	Provisional category	Summary
Tridacna crocea	Possible Concern	Considered widespread and possibly abundant, although recent surveys indicate lower densities than previously reported. The trade and export of wild-sourced specimens was reported to be prohibited, although trade in high quantities was reported by importers during 2000-2004, with lower numbers reported in more recent. While the impact of recent international trade levels is likely to be small, it is not clear whether or not the provisions of Article IV are being implemented and therefore categorised as Possible Concern.
Tridacna derasa	Urgent Concern	Limited distribution within the Solomon Islands and recent surveys found depleted populations. It is the main species used in mariculture production in the Solomon Islands. The trade and export of wild-sourced specimens was reported to be prohibited, although high quantities of wild-sourced, live specimens were reported by importers (e.g 7187 specimens in 2009), and lower levels of trade in captive-bred and captive-born specimens. As the impact of high levels of current international trade is not known but status unfavourable, and no information was available on the implementation of Article IV, categorised as Urgent Concern.
Tridacna gigas	Possible Concern	Previously widespread and abundant, however recent surveys indicate depleted populations. Main threats include commercial and subsistence harvesting. The trade and export of wild-sourced specimens was reported to be prohibited, although low quantities of live wild-sourced specimens was reported by importers 2000-2005 and trade in wild-sourced shells 2004-2009 was reported. The impact of recent levels of international trade is not known and it is not clear whether or not the provisions of Article IV are being implemented, therefore categorised as Possible Concern.
Tridacna maxima	Least Concern	Widespread in the Solomon Islands, one of the most common *Tridacna* species in the country although recent surveys indicate lower densities than previously reported. The trade and export of wild-sourced specimens was reported to be prohibited, and no trade in wild-sourced specimens reported since 2005. Therefore, on the basis of no anticipated trade in wild-sourced specimens, categorised as Least Concern.

Species	Provisional category	Summary
Tridacna squamosa	Possible Concern	Widespread in the Solomon Islands, one of the most common *Tridacna* species in the country although recent surveys indicate lower densities than previously reported. The trade and export of wild-sourced specimens was reported to be prohibited, although trade in live wild-sourced specimens was reported by importers 2000-2005 and moderate trade in wild-sourced shells in 2005, 2008 and 2009. The impact of recent levels of international trade is not known and it is not clear whether or not the provisions of Article IV are being implemented, therefore categorised as Possible Concern.

B. Overview of *Tridacna* spp.

Biology: The family Tridacnidae (Giant clams) comprises the genera *Tridacna* and *Hippopus* and includes the largest marine bivalves in the world (Kinch and Teitelbaum, 2010). *Tridacna* spp. were reported to be found typically in clear, warm and shallow (above 20 m depth) waters with high salinity (Apte *et al.,* 2004). The recorded optimal temperatures range between 25 and 30°C and optimal salinity levels range between 32 and 35 parts per thousand (Ellis, 1998). Typical habitats were considered to include shallow shorelines and coral reefs (Othman *et al.,* 2010). Natural predators include fish, molluscs, crustaceans and marine turtles (Raymakers *et al.,* 2003).

All *Tridacna* spp. were reported to mature as males, after which they develop into hermaphrodites (Ellis, 1998). The fecundity of *Tridacna* spp. was found to increase with the age and size of individuals (Apte *et al.,* 2004), and Gervis (1993) reported that the largest individuals of *T. derasa* and *T. gigas* could produce 500 million eggs in a single spawning event. Spawning was found to be seasonal in some areas, and occurs year round in other areas (Kinch and Teitelbaum, 2010). Due to their spawning pattern, *Tridacna* reproduction was found to be unsuccessful at low densities of mature individuals (Kinch, 2009).

The development from fertilization to a juvenile clam was reported to last about 10-14 days (Ellis, 1998), which was considered to limit the distribution abilities of *Tridacna* spp. (Apte *et al.,* 2004). The age of sexual maturation was estimated to be at an average of 5-7 years (Kinch and Teitelbaum, 2010). Apte *et al.* (2004) indicated that after fast growth in the early years, *Tridacna* spp. are slow-growing, and Wells (1997) reported that although the fecundity was high, the natural recruitment rates were low due to high rates of early mortality. Life spans of over 100 years were recorded (Apte *et al.,* 2004).

Although they obtain a part of their nutrition by filter feeding, all *Tridacna* spp. get a significant proportion of nutrients through symbiosis with photosynthetic zooxanthellae algae (Lucas, 1988; Bell and Amos, 1993; Ellis, 1998). The algae live in the mantle tissue of *Tridacna* spp., producing sugars, amino acids and fatty acids used by its host (Ellis, 1998; 1999). The growth of *Tridacna* spp. is influenced by factors such as water temperature and clarity, wave action and water flow (Hart *et al.,* 1998).

Taxonomic note: No CITES standard references have been adopted for Tridacnidae spp.

Othman *et al.* (2010) considered the family Tridacnidae to include ten species: *Hippopus hippopus*, *H. porcellanus*, *T. costata*, *T. crocea*, *T. derasa*, *T. gigas*, *T. maxima*, *T. rosewateri*, *T. squamosa* and *T. tevoroa*. Older sources did not recognise *T. costata*, which was recently described in the Red Sea (Richter *et al.,* 2008). *T. tevoroa* is often considered as a synonym to *T. mbulvuana*, a fossil species (Wells, 1997; Newman and Gomez, 2000).

Furthermore, some authors do not recognise *T. rosewateri* as an independent species (Kinch and Teitelbaum, 2010), and although the species was found to differ from *T. squamosa* in several ways, Newman and Gomez (2000) concluded that it was likely closely related to, or an ecotype of *T. squamosa*.

Distribution in range States: The range of *Tridacna* spp. was reported to reach from East Africa to the eastern Pacific and from Japan to Australia, roughly between 30°E and 120°W and between 36°N and 30°S (Othman *et al.,* 2010). The range of *Tridacna* was considered to have decreased due to exploitation, particularly for the larger species (Skewes, 1990).

Five *Tridacna* species were reported to occur in the Solomon Islands: *T. crocea*, *T. derasa*, *T. gigas*, *T. maxima* and *T. squamosa* (Wells, 1997; Green *et al.,* 2006; Pauku and Lapo, 2009), and all except *T. derasa* were considered to be widespread within the country (Govan, 1988; Richards *et al.,* 1994).

Population trends and status: The population of *Tridacna* spp. was reported to be globally declining (Isamu, 2008; Othman *et al.,* 2010), with particular declines reported for the larger species *T. derasa* and *T. gigas* (Wells, 1997). Severe overfishing was reported to have led to an overall decline and several regional extinctions of *Tridacna* spp. in the Indo-Pacific region by the 1980s (Lucas, 2003). The current status of *Tridacna* spp. populations in Solomon Islands was described as "unknown" (Horokou *et al.,* 2010). In Rapid Ecological Assessment surveys conducted in 2004, where approximately one hectare was surveyed in each of 59 locations in the main island group, Tridacnidae spp. were considered to be "relatively rare" (Turak, 2006). In a related survey of invertebrate species, conducted in 2004 at 66 sites in the main island group, the low mean densities of the larger species (*T. gigas* and *T. derasa)* were considered to be a cause of concern, and the densities of the smaller species were reported to be lower than those measured in earlier studies in the 1990s (Ramohia, 2006). Earlier records indicated more abundant populations: Skewes (1990) considered Solomon Islands as "one of the few countries in the [Pacific] region with relatively good stocks of giant clams", Hviding (1993) considered most stocks to be "in a fairly good condition in most parts of the archipelago", and Wells (1997) reported that, after the Australian Great Barrier Reef, Solomon Islands, Palau and Fiji had the second largest populations of Tridacnidae. Richards *et al.* (1994) reported that the most abundant *Tridacna* spp. populations in Solomon Islands were found in remote areas, and in areas where marine invertebrates were not eaten due to religious beliefs.

The Arnavon Marine Conservation area was reported to host large populations of Tridacnidae, with higher mean densities than in other areas in the country (Lovell *et al.,* 2004; Ramohia, 2006). Ramohia *et al.* (2005a) conducted transect surveys in the Maravaghi community-based Marine Protected Area (MPA) in Ngella in the Central Province, recording Tridacnidae abundances of 50-250 individuals per ha.

It was noted that the common practice of "clam gardens", where villagers collect adult clams from the wild and keep them aggregated in shallow reefs adjacent to their homes, contributed to the local abundance of *Tridacna* spp. and may increase spawning success in a local scale (Richards *et al.,* 1994).

Threats: Harvesting for export and subsistence use was considered to be the major cause of population decline (Friedman and Teitelbaum, 2008). As slow-growing, visible organisms usually found in easily accessible shallow waters, *Tridacna* spp. were considered to be very vulnerable to overharvesting (Sant, 1995; Kinch, 2002; Friedman and Teitelbaum, 2008). In some areas of the Solomon Islands, heavy exploitation was considered to have led to near extinction of Tridacnidae (Green *et al.*, 2006).

The demand for *Tridacna* meat was reported to be particularly high in Asia (Kinch and Teitelbaum, 2010), with adductor muscle favoured in the Chinese and Taiwanese markets, and sushi and sashimi meat in the Japanese market (Shang *et al.,* 1991; Wells, 1997; Lucas, 2003; Kinch, 2009). In the early 1990s, the estimated annual catch of Tridacnidae from the wild for international trade was 1.5 to 2.5 million specimens globally (Wells, 1997). Large-scale commercial harvesting was reported to have taken place in Solomon Islands during the 1970s-1980s, reaching a peak catch of about 10.2 tonnes of adductor muscle for export in 1983 (Pauku and Lapo, 2009). With adductor muscle representing only about 12 per cent of the total meat weight, the harvesting rates were considered to represent "overfishing of severely depleted populations" (Pauku and Lapo, 2009).

Illegal fishing by foreign vessels was considered the main contributor to Tridacnidae overfishing between the 1960s and 1980s (Kinch and Teitelbaum, 2010). More recently, international pressure and improved surveillance have been reported to have helped reduce illegal industrial fishing (Kinch, 2009; Kinch and Teitelbaum, 2010).

In the Solomon Islands, *Tridacna* spp. were reported to have an important role in subsistence and small scale fisheries (Pauku and Lapo, 2009), and also used for ornamental purposes and jewellery (Govan, 1988). Ramohia (2006) found evidence of possible Tridacnidae overfishing for subsistence purposes in marine surveys conducted in 2004 within the Solomon Islands, and a questionnaire survey conducted in the Bellona Island by Thaman *et al.* (2010) showed that Tridacnidae were "increasingly rare because of overexploitation and tropical cyclones". Kinch *et al.* (2006) noted that even in those communities where Tridacnidae species were not consumed due to religious reasons, there were signs of over-exploitation, presumably due to local demand from the capital city Honiara's hotels and restaurants.

Other threats to *Tridacna* spp. were reported to include habitat degradation, pollution, disease and increased sea temperatures (Mingoa-Licuanan and Gomez, 2002; Raymakers *et al.,* 2003; Othman *et al.,* 2010).

Overview of trade, management and mariculture in the genus

Trade: The species *T. derasa*, *T. gigas* and *T. maxima* were listed in CITES Appendix II on 29/07/1983; the entire family Tridacnidae was listed in CITES Appendix II on 01/08/1985. The Solomon Islands became a Party to CITES in 2007 and has not yet submitted an annual report.

According to importer-reported data in the CITES Trade Database, trade in species of *Tridacna* originating in the Solomon Islands principally involved live specimens and shells, the vast majority of which was for commercial purposes. A total of 88 907 live specimens (53 per cent wild-sourced; 34 per cent captive-bred and 12 per cent captive-born) and 181 kg of live specimens (all wild-sourced) were imported directly from the Solomon Islands over the period 2000-2010. *Tridacna crocea* (40 per cent) and *Tridacna derasa* (40 per cent) accounted for the majority of the trade in live specimens, with *Tridacna derasa* comprising a larger proportion of the wild-sourced trade (51 per cent of live specimens and 100 per cent of live recorded by weight). In addition to the trade in live specimens, 8 706 shells (44 per cent wild-sourced; 51 per cent captive-born and 6 per cent captive-bred) and 100 kg of meat (all captive-born) were imported over this period. A small proportion of the trade (34 live, captive-bred specimens and one confiscated shell) was recorded at the genus level (*Tridacna* spp.).

In addition to the trade recorded at the species and genus level, trade reported at the family level (Tridacnidae spp.) over the period 2000-2010 comprised 450 live specimens, 70 shells, 20 kg of meat and 38 meat reported without units. This trade, however, may also include the

species *Hippopus hippopus* which occurs in the Solomon Islands.

Management: The harvesting of wild-sourced Tridacnidae species for commercial trade was reportedly banned in the Solomon Islands under the Fisheries Regulation (1998) (Horokou *et al.,* 2010). The Section 23 of the current Fisheries Regulation stated that "any person who has in his possession for sale, sells or buys or exports any clam meat or the product of clams of the genus *Tridacna* and *Hippopus* harvested from the wild, shall be guilty of an offence and liable to a fine of one hundred dollars or to imprisonment for three months or to both such fine and imprisonment" (Solomon Islands Consolidated Legislation, 1996). However, it was reported that the trade and export of farmed specimens were allowed (Solomon Islands, 2009).

The conservation and management of CITES-listed species in the Solomon Islands is regulated under the Wildlife Protection and Management Act (Horokou *et al.,* 2010). *T. crocea*, *T. derasa*, *T. gigas*, *T. maxima* and *T. squamosa* are included in Schedule II (regulated and controlled species) of the Act, banning exports of any specimen unless with valid permits (Solomon Islands Sessional Legislation, 1998). The Act states that an attempt to export specimens for commercial purposes without a valid permit may lead to a fine of a maximum of three thousand dollars or imprisonment of a maximum of three months (Solomon Islands Sessional Legislation, 1998). Lack of capacity for implementation and enforcement of CITES, and lack of education and awareness were considered factors that limit the compliance with CITES in Solomon Islands (Kinch and Teitelbaum, 2010).

Green *et al.* (2006) considered the lack of regulations on subsistence harvesting within Solomon Island as a possible threat to particularly *T. gigas* and *T. derasa*. However, Kinch *et al.* (2006) noted that there were various forms of local, traditional management of Tridacnidae, including fishing restrictions in certain areas or at certain times.

The giant clams have been included in the CITES Review of Significant Trade on a number of occasions. In 1995, the family Tridacnidae was included in Phase 3 of the Review of Significant Trade review, following which the Solomon Islands notified the Secretariat that the export of wild-sourced specimens was prohibited, and that only exports of cultured giant clams was allowed (AC22 Inf. 12; AC 13.14.1; IUCN, 2006b).

In 2004, at the 20th meeting of the Animals Committee, all six Tridacnidae species (five species of *Tridacna* and one species of *Hippopus*) occurring in the Solomon Islands were included in the Review of Significant Trade (AC20 Summary Report). The Solomon Islands was subsequently excluded from this process at the 21st Animals Committee meeting. At the 22nd meeting of the Animals Committee, it was noted that trade from the Solomon Islands continued to be a concern and that some sources indicated a significant decrease in aquaculture activities due to civil unrest, and CITES Parties had reported imports of wild-sourced specimens (IUCN, 2006b). It was recommended that the origin of the specimens in trade should be verified (IUCN, 2006b). At the 24th meeting of the Animals Committee, it was agreed to include *Tridacna* spp. from the Solomon Islands in the Review of Significant Trade as an urgent case (AC24 Summary document).

In 2009, representatives of Solomon Islands attended a CITES Regional Workshop that aimed to ensure the ecological, social and economic sustainability of Tridacnidae fisheries (Kinch and Teitelbaum, 2010). At the workshop, several challenges in the Pacific region were identified in the sustainable management of Tridacnidae spp., including lack of capacity for i) conducting stock assessments, ii) promoting giant clam culture, iii) enforcing harvesting regulations and iv) managing and monitoring harvests (Kinch and Teitelbaum, 2010). It was suggested that improvements in the management of Tridacnidae in the region could include strengthening legislation at the national level and producing National Giant Clam

Management Plans in each Pacific Island Country and Territory (PICT), where these are currently lacking. In the Solomon Islands, the lack of capacity to conduct stock assessments was considered to limit the opportunities of sustainable management in the country (Kinch and Teitelbaum, 2010).

Tridacnidae spp. are found in the Arnavon Marine Conservation Area (Lovell *et al.,* 2004). Green *et al.* (2006) reported that several community Marine Protected Areas (MPAs) had been established in the Solomon Islands, and that these MPAs, although small in size, could be effective as a network of protected areas. Surveys conducted in 2004 confirmed that *Tridacna* spp. occurred in the Marapa and Simeruka MPAs in Marau Sound, Central Province (Ramohia, 2004), the Sisili and Taburu MPAs (Ramohia *et al.,* 2005b) and the Maravaghi MPA in Ngella in the Central Province (Ramohia *et al.,* 2005a).

Mariculture: The Solomon Islands was regarded as one of the pioneering countries in the development of Tridacnidae mariculture (Wells, 1997), which was initiated in the 1980s (Teitelbaum and Friedman, 2008). Generally, Tridacnidae culture was reported to include three stages: 1) land-based nursery, where the spawning of broodstock is induced and larvae are reared; 2) ocean nursery, where juvenile clams are kept in protective cages and tended regularly; and 3) ocean grow-out phase, where larger individuals are left to grow with little tending needed (Skewes, 1990; Ellis, 1998). Ellis (1998) noted that either wild-caught or hatchery-reared clams could be used as broodstock. Mariculture production was seen as an attractive option due to the low nutritional requirements of the species, high initial fecundity, availability of suitable shallow coastal areas and relatively simple techniques required for breeding and rearing (Bell *et al.,* 1997; Wells, 1997; Ellis, 1998).

Initially, mainly the largest *Tridacna* species (*T. gigas* and *T. derasa*) were selected for hatchery production (Tisdell, 1986), however, it was found that due to slow growth and low survival, the production of meat and shells in aquaculture appeared to be economically unviable (Hambrey and Gervis, 1993; Hart *et al.,* 1998), and it was suggested that better results could be gained by farming smaller-sized species for aquarium trade (Hart *et al.,* 1998), producing marketable-sized specimens in 18-24 months (Kinch and Teitelbaum, 2010). Selective breeding methods were developed to improve the quality of captive-bred specimens for the aquarium market (Wells, 1997), and the popularity of Tridacnidae spp. in the global aquarium trade was reported to have increased significantly (Kinch and Teitelbaum, 2010; Othman *et al.,* 2010). Teitelbaum and Friedman (2008) noted that whereas the supply of wild *Tridacna* spp. from Solomon Islands decreased during the past years, the country had become one of the main producers of cultured clam for aquarium trade.

The Aquaculture Division of the Ministry of Fisheries and Marine Resources was established in 2000 to support aquaculture development in the Solomon Islands (Ministry of Fisheries and Marine Resources, 2009). The Solomon Islands Aquaculture Development Plan for the years 2009-2014 listed *Tridacna* spp. as one of the priority aquaculture commodities (Ministry of Fisheries and Marine Resources, 2009). *Tridacna* spp. were considered well-suited for aquaculture in Solomon Islands due to i) good availability of broodstock, ii) large coastline, iii) relatively skilled labour force, iv) low cost of labour, v) good quality water resources and vi) relative closeness to export markets and an expanding domestic market (Ministry of Fisheries and Marine Resources, 2009). Constraints to successful aquaculture production included i) unstable government and lack of clear aquaculture policies, ii) lack of appropriate skill, know-how and access to information, iii) lack of infrastructure, iv) lack of "in-country" competition, v) lack of encouragement for investment and vi) geographical barriers for transportation (Ministry of Fisheries and Marine Resources, 2009).

A number of actions were proposed in the Solomon Islands aquaculture development plan (Ministry of Fisheries and Marine Resources, 2009) which included maintaining a ban on the export of wild Tridacnidae and supporting production of hatchery-based clams on village farms.

It was reported that between 1997-2001, over 60 000 Tridacnidae specimens (consisting of *T. gigas*, *T. derasa*, *T. squamosa*, *T. maxima*, *T. crocea* and *Hippopus hippopus*) were exported from 25 village farms in the Solomon Islands (Ministry of Fisheries and Marine Resources, 2009). However, the production of hatchery-reared individuals for grow-out on village farms was disrupted in 1999-2000 and 2000-2003 as a result of ethnic tensions (Ministry of Fisheries and Marine Resources, 2009). The village farming systems were described as "simple, low-cost and low-input operations" (Hean and Cacho, 1999).

More recently, Tridacnidae farming in Solomon Islands was reported to be supported by the WorldFish Center and funded by NZAID (Ministry of Fisheries and Marine Resources, 2009). Farming activities were reported to concentrate on *T. derasa*, with plans to expand the production to cover other species as well (Ministry of Fisheries and Marine Resources, 2009). The export rates of aquaculture-produced specimens were expected to increase in the future, although the attractiveness of aquaculture production to private investors was considered limited due to conflicts related to the customary rules on sea access rights and ownership in Solomon Islands (Ministry of Fisheries and Marine Resources, 2009).

C. Species reviews

Tridacna crocea Lamarck, 1819: Solomon Islands.

Biology: *Tridacna crocea* was reported to be the smallest *Tridacna* species (Rosewater, 1965), with a maximum length of 15 cm, although not usually exceeding 11 cm (Kinch and Teitelbaum, 2010). Hamner and Jones (1976) recorded annual growth rates of 2 cm in the first year and 1.5 cm in the second and third years, after which the growth rate was reported to decline.

The species is typically found deeply burrowed in coral substrate, in lagoons that experience runoff of fresh water, and it appears to be well adapted to lower salinity levels (Hamner and Jones, 1976; Hart *et al.*, 1998; Kinch and Teitelbaum, 2010). According to Kinch and Teitelbaum (2010), it is sometimes found in very shallow waters, and can occur in depths up to 20 m in clear waters.

Distribution in range State: *T. crocea* has a wide distribution, ranging from Australia to Japan, and from Vanuatu to Indonesia (Mollusc Specialist Group, 1996).

The species was considered widespread in the Solomon Islands (Govan, 1988; Wells, 1997), and has been found in reasonable numbers in most parts of the country (Hviding, 1993).

However, in a 2004 survey of key invertebrate species conducted at 66 sites in the main island group of the Solomon Islands, excluding the remote islands and atolls, *T. crocea* was found at only 24 per cent of the studied sites, being significantly less frequent than *T. maxima* or *T. squamosa* (Ramohia, 2006).

Population trends and status: *T. crocea* was categorised as Lower Risk/least concern in the IUCN Red List, although it was noted that the assessment needed updating (Mollusc Specialist Group, 1996). Wells (1997) described it as "reasonably abundant" throughout its range, although many populations in Southeast Asia were considered to be in decline.

Within Solomon Islands, Hviding (1993) regarded it abundant and in some localities, very

abundant (Govan, 1988; Hviding, 1993).

T. crocea was found to be the most abundant Tridacnidae species recorded during biological surveys in the Marovo Lagoon in the Western Province (Kinch *et al.,* 2006), as well as in transect surveys conducted in 2004 in the Marapa and Simeruka MPAs in Marau Sound, Central Province (Ramohia, 2004) and in the Sisili and Taburu community-based MPAS in Ngella in the Central Province (Ramohia *et al.,* 2005b). However, it was noted that the recorded densities of 5-24 individuals per hectare observed in the Marau Sound as well as the densities of 300 and 217 individuals per hectare observed in the Sisili and Taburu MPAs respectively, were low compared to other similar studies (Ramohia, 2004; Ramohia *et al.*, 2005b). Ramohia *et al.* (2005a) recorded mean densities of 33-67 individuals per ha in the Maravaghi community-based MPA in Ngella in Central Province, which were also considered low for the species. In a survey of invertebrate species conducted in the main island group, Ramohia (2006) recorded densities of 15 individuals per hectare.

Threats: Overfishing was considered to be the main threat to *T. crocea*; however, as a small, burrowing species, it was considered less prone to overfishing than the other *Tridacna* species (Allen *et al.,* 2003; Othman *et al.*, 2010).

T. crocea was reported to be in high demand for aquarium trade due to its desirable colouring (Wabnitz *et al.,* 2003; Hean and Cacho, 2003; Kinch and Teitelbaum, 2010), with individuals 2.5-10 cm in size being worth USD 15-105 (Mingoa-Licuanan and Gomez, 2002). It was also reported to be a commonly used species for sashimi and sushi in Japan (Wells, 1997).

In the Solomon Islands, *T. crocea* was considered to be the most important Tridacnidae species used as staple food in local households, and as a consequence, overharvested in some areas (Hviding, 1993).

Trade: As the Solomon Islands has not yet submitted a CITES annual report, trade figures are based on data submitted by importers. According to data in the CITES Trade Database, imports of *T. crocea* from the Solomon Islands for the years 2000-2010 principally comprised live specimens including 15 270 wild-sourced, 14 731 captive-bred and 5722 captive-born live animals (Table 1). Imports of lower numbers of shells were also reported by importers. All trade was reported as being for commercial purposes. Imports decreased markedly between 2000-2010, with over 95 per cent of the trade in live specimens and shells combined occurring in the first half of the period.

Table 1. Direct trade in *Tridacna crocea* from the Solomon Islands, 2000-2010 (all trade reported by importers). (No trade was reported in 2007 or 2010.)

Term	Source	2000	2001	2002	2003	2004	2005	2006	2008	2009	Total
live	W	1273	5400	3864	9	3754	745	4	221		15270
	C	2251	3626	4067	2267	1920				600	14731
	F		700	1746	3276						5722
shells	W						100				100
	C	53	200								253

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Indirect trade in *T. crocea* originating in the Solomon Islands over the period 2000-2010 comprised 940 live specimens (58 per cent captive-bred; 42 per cent wild-sourced) and 12 shells (all captive-bred) as reported by importers, and 587 live specimens (51 per cent captive-bred; 28 per cent wild-sourced and 21 per cent captive-born) as reported by re-exporters. All re-exports were reported for commercial purposes, and the majority of trade was re-exported by the United States. No re-exports of *T. crocea* originating in the Solomon

Islands have been reported since 2006.

Management: The trade and export of wild-sourced specimens were reported to be banned in the Solomon Islands (Solomon Islands Consolidated Legislation, 1996), however the trade and export of farmed specimens is permitted (Solomon Islands, 2009). It was reported that subsistence harvesting was not regulated (Green *et al*., 2006) although local, traditional management practices were practiced in some areas (Kinch *et al*., 2006) whereby overharvested areas are left to recover for some years to guarantee sustainable resource (Hviding, 1993). Further details are provided in the genus overview.

In large-scale grow-out trials conducted at 11 village farms in the Solomon Islands, *T. crocea* was found to grow to a mean size of 5.2 cm (±0.81 s.d.) in 22 months, and its survival rate after 17 months was 39 per cent (±22.6 s.d.) (Hart *et al.,* 1998). Due to these comparatively low growth and survival rates, Hart *et al.* (1998) regarded the species less suitable for village farming than *T. derasa* or *T. maxima*, in spite of its high demand in aquarium trade.

Tridacna derasa (Röding, 1798): Solomon Islands.

Biology: *Tridacna derasa* was reported to commonly reach a shell length of 50 cm, with a maximum of 60 cm reported (Kinch and Teitelbaum, 2010). It reaches maturity as a male at 5 years and as a hermaphrodite at 10-11 years (Raymakers *et al.,* 2003). It prefers the outer edge areas of coral reefs and may occur from shallow water to up to 20 m depth (Kinch and Teitelbaum, 2010).

Distribution in range State: The native range of *T. derasa* was reported to extend from Australia to Philippines and from Indonesia to Tonga (Wells, 1996a).

The species was described as globally "frequent" (Dance, 1974) although with a "patchy" geographic distribution, being less frequent in some areas (Adams *et al.,* 1988). It was considered to be the only *Tridacna* species with a limited distribution within the Solomon Islands Main Group Archipelago (MGA) (Govan, 1988; Richards *et al.,* 1994). The species had been recorded in Marau Sound, Nggela and Russel Islands in the Central Province and in north Marovo Lagoon in the Western Province, although it was considered possible that it also occurred elsewhere (Wells, 1997). Ramohia *et al.* (2005a) recorded the species in the Maravaghi community-based MPA in Nggela, however the species was not recorded in similar surveys conducted in the Sisili and Taburu community-based MPAs in Nggela in the Central Province (Ramohia *et al.,* 2005b).

Population trends and status: Globally, population declines have been reported by IUCN *et al.,* (2006b), Wells (1997), Isamu (2008) and Othman *et al.* (2010). Local or national extinctions were reported to have occurred in several countries (IUCN, 2006b). *T. derasa* was categorised as Vulnerable in the IUCN Red List, although it was noted that the assessment needed updating (Wells, 1996a).

T. derasa was considered to be "reasonably abundant" in the Solomon Islands (IUCN, 2006b). Oengpepa (1993) reported severely depleted populations in many areas within the Solomon Islands, referring to surveys conducted between 1987-1991 by the International Center for Living Aquatic Resources Management (ICLARM). In a survey of key invertebrate species conducted at 66 sites in the main island group, *T. derasa* was found to be the rarest of the *Tridacna* species, occurring at 11 per cent of the studied sites at average densities of less than 4 individuals per hectare (Ramohia, 2006). These densities were considered low compared to those recorded in earlier studies, which was regarded as a cause of concern (Ramohia, 2006).

Kinch *et al.* (2006) did not record the species in surveys conducted in the Marovo Lagoon in the Western Province, concluding that this was possibly a result of overexploitation. In transect surveys conducted in the Maravaghi community-based MPA in Nggela in Central

Province, densities of 0-17 individuals per ha were recorded by Ramohia *et al.* (2005a). Ramohia (2004) reported a mean density of less than one individual per hectare in transect surveys conducted in 2004 in the Marapa and Simeruka MPAs in Marau Sound, Central Province.

Threats: Subsistence harvesting was considered to be the main threat to the species (IUCN, 2006b, Teitelbaum and Friedman, 2008b); it was also reported to be marketed in aquarium trade (Mingoa-Licuanan and Gomez, 2002) and have a high demand in the adductor muscle market (Shang *et al.*, 1991).

Tridacna spp. were reported to be frequently used for subsistence purposes in the Solomon Islands (Horokou *et al.*, 2010), although Hviding (1993) noted that it was the species of *Tridacna* of least importance in subsistence harvesting.

Trade: As the Solomon Islands has not yet submitted a CITES annual report, trade figures are based on data submitted by importers. According to data in the CITES Trade Database, direct trade in *T. derasa* from the Solomon Islands reported by importers in the period 2000-2010 principally comprised live specimens (Table 2). In total, 35 693 live specimens and 181 kg of live specimens were imported, of which the majority were wild-sourced (68 per cent of live individuals and 100 per cent of live recorded by weight). The remaining live specimens were captive-bred (24 per cent) and to a lesser extent captive-born (7 per cent). Over the same period, 4920 shells were imported, of which 89 per cent were captive-born, 6 per cent were wild-sourced and 4 per cent were captive-bred. The United States reported the majority of imports of live specimens (30 574 animals), including 24 147 wild-sourced specimens.

Live, wild-sourced *T. derasa* imports decreased between 2000 and 2006, but subsequently increased to a peak of 7187 individuals in 2009. Similarly, captive-born and captive-bred live imports decreased in the first half of the period, but subsequently increased to a total of 1320 individuals in 2009. Trade in shells was generally low with the exception of 2006, when the import of 4400 shells was reported by Australia.

Table 2. Direct trade in *Tridacna derasa* from the Solomon Islands, 2000-2010 (all trade reported by importers).

Term	Source	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
live	W	5543	1815	45	205	30	38		3983	5501	7187		24528
	C	4638	1542	1322	5	125				100	997		8729
	F		700	100	1				375	817	323	100	2416
	I										201		201
live (kg)	W									181			181
shells	W						100			48	169		317
	C		200		3								203
	F							4400					4400
meat (kg)	F							100					100

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Re-exports of *T. derasa* originating in the Solomon Islands over the period 2000 to 2010 comprised 1064 live specimens and 1700 shells as reported by importers and 519 live specimens and 3400 shells as reported by re-exporters. Live specimens were principally wild-sourced (52 per cent according to importers; 80 per cent according to re-exporters) and captive-bred (47 per cent according to importers; 19 per cent according to re-exporters), and shells were all recorded as captive-born. The majority of trade (including all wild-sourced trade) was re-exported by the United States.

Management: The export and trade of wild-sourced specimens was reported to be banned in the Solomon Islands (Solomon Islands Consolidated Legislation, 1996), however the trade and export of farmed specimens was allowed (Solomon Islands, 2009). The lack of regulations on subsistence harvesting was considered to be a particular threat to *T. derasa* (Green *et al.,* 2006). Traditional local management practices were reported to be in place in some areas (Kinch *et al.,* 2006). Further details are provided in the genus overview.

The Solomon Islands Ministry of Fisheries and Marine Resources (2009) reported that Tridacnidae farming in the country focuses on *T. derasa,* due to its fast growth and durability. *T. derasa* was considered to be well suited for meat production due to its good survival and high meat gain (SPC Aquaculture Portal, 2009). Hean and Cacho (2003) considered it to be the species of Tridacnidae with the best potential for mariculture production as seafood. The species was also considered to show good potential for the production of aquarium specimens, and possibly adductor muscle, on village farms (Hart *et al.,* 1998). In large-scale grow-out trials conducted in 11 village farms in the Solomon Islands, *T. derasa* was found to attain a mean shell length of 15 cm (±1.98 s.d.) in a grow-out of 24 months, with a 92.2 per cent (±9.1 s.d.) survival rate (Hart *et al.,* 1998). The results indicated that grow-out time needed to produce individuals of optimum size for the aquarium market was only 7 months (Hart *et al.,* 1998).

Since the establishment of small-scale farming programmes for rural communities by the WorldFish Center during the 1990s, hatchery-reared juvenile *T. derasa* was reported to continue to be supplied to farmers in the Western Province who then tended the clams during the grow-out stage (Horokou *et al.,* 2010). After grow-out in the villages, these specimens were sold to the company Aquarium Arts, which exported specimens for the global marine aquarium trade (Horokou *et al.,* 2010). In 2007, Solomon Islands was reported to have produced 4300 individuals of cultured *T. derasa* for the aquarium trade, with an estimated national export potential of 15 000 cultured individuals (Kinch and Teitelbaum, 2010).

T. derasa was previously selected for the Review of Significant Trade at the 20th meeting of the Animals Committee in 2004 (AC20 Summary Record), and although Solomon Islands was not one of the countries selected for review, it was noted that the significant trade from Solomon Islands "continues to be of concern", and that as the trade of wild-sourced specimens had been reported by importers, the nature of all specimens in trade should be verified (IUCN, 2006b).

Tridacna gigas (Linnaeus, 1758): Solomon Islands.

Biology: The largest Tridacnidae species *Tridacna gigas* commonly grows up to 80 cm in length (Kinch and Teitelbaum, 2010) although it can grow to a maximum shell length of 137 cm (Kinch, 2002) and weight of 260 kg (Oliver, 1975). The species was reported to reach sexual maturity as a male at about 37 cm shell length, and as a hermaphrodite at the age of 9-10 years (Raymakers *et al.,* 2003). Munro (1993) reported that an individual of 70-80 cm shell length was capable of producing up to 240 million eggs.

T. gigas was reported to be the fastest growing Tridacnidae species (Pernetta, 1987), with mean growth rates of 4.1 mm per month measured in wire mesh cages in shallow, subtidal coral reefs in the Solomon Islands (Bell *et al.*, 1997). Munro (1983) reported that it may reach 50 cm length and 6 kg flesh weight in 5-7.5 years.

Preferred habitats were reported to include sandy bottoms or coral rubble on shallow lagoons and coral reef flats (Tervo and Csomos, 2001).

Distribution in range State: *T. gigas* was reported to be widespread, occurring from the

Indo-Pacific (including South China Sea and Coral Sea) to Indonesia, Marshall Islands and the Great Barrier Reef in Australia (IUCN *et al.,* 1996).

T. gigas was considered to be widespread in the Solomon Islands (Govan, 1988; Wells, 1997), found in most parts of the country (Hviding, 1993). However, in transect surveys conducted in 2004 in the Maravaghi community-based MPA in Ngella in Central Province (Ramohia *et al.*, 2005a), in the Sisili and Taburu community-based MPAs in Ngella in the Central Province (Ramohia *et al.,* 2005b), and in the Marapa and Simeruka MPAs in Marau Sound, Central Province (Ramohia, 2004), the species was not recorded. Similarly, Kinch *et al.* (2006) did not record the species in the Marovo Lagoon in the Western Province.

Population trends and status: The species was categorised as Vulnerable in the IUCN Red List (Wells, 1996b), although the status assessment needs updating. Many populations in Southeast Asia were considered to be in sharp decline (Othman *et al.,* 2010).

Wells (1997) considered the Solomon Islands as the only country besides Australia to have abundant populations of *T. gigas*, even if the species was considered to be found in low numbers. Skewes (1990) stated that the populations of *T. gigas* in the Solomon Islands showed no signs of local extinctions due to overfishing. Hviding (1993) reported that the species was found "in reasonable numbers in most parts of Solomon islands", but noted that the populations were depleted in some areas. Oengpepa (1993) reported severely depleted populations in many areas, referring to surveys conducted between 1987-1991 by the International Center for Living Aquatic Resources Management (ICLARM) staff, and noted that the decline was "continuing at an alarming rate", and that it was "attributed to overharvesting by coastal dwellers".

In a survey of key invertebrate species conducted at 66 sites in the main island group of the Solomon Islands, excluding the remote islands and atolls, Ramohia (2006) recorded the species at 14 per cent of the studied sites; a total of 12 individuals were recorded in the surveys and the average densities of 4 individuals or less per hectare were regarded as a cause of concern (Ramohia, 2006). In related Rapid Ecological Assessment (REA) surveys, *T. gigas* was recorded at 5 out of 113 sites, with each site surveyed covering an area approximately 5000 m^2 (Turak, 2006).

Threats: Overexploitation for commercial and subsistence purposes was considered to be the main threat to the species (IUCN *et al.,* 1996; Wells, 1997; Othman *et al.,* 2010). In the Solomon Islands, *Tridacna* spp. were reported to be frequently used for subsistence purposes (Horokou *et al.,* 2010), and often used as ceremonial food and food for feasts (Hviding, 1993). Lukan and Brough (2011a) noted that due to its attractive colouring and easy care, the species was particularly suitable for aquarium trade.

Kinch *et al.* (2006) suggested that overexploitation was possibly the cause of the species' absence in surveys conducted in the Marovo Lagoon in the Western Province.

Mass mortalities were reported in the Solomon Islands in 1992 in both, farmed and natural populations (Newman and Gomez, 2000), possibly linked with a pronounced El Niño event (Richards *et al.,* 1994). Studies also showed that human-induced increase in water turbidity (Elfwing *et al*., 2003), bleaching (Leggat *et al.,* 2003), decreased salinity levels and copper pollution (Blidberg, 2004) were associated with reduced growth of *T. gigas*.

Trade: As the Solomon Islands has not yet submitted a CITES annual report, trade figures are based on data submitted by importers. According to data in the CITES Trade Database, direct trade in *T. gigas* from the Solomon Islands reported by importers 2000-2010 consisted of 1777 shells, of which 99 per cent were wild-sourced, and 971 live specimens, of which 95 per cent were captive-born or captive-bred (Table 3). The majority of shells were

imported between 2007 and 2009, with imports increasing from five shells in 2003 to 611 shells in 2009. In contrast, the majority of live specimens were imported between 2000 and 2005, with the import of 200 captive-bred, live specimens in 2009 the only trade reported since then.

Re-exports of *T. gigas* originating in the Solomon Islands 2000-2010 consisted of 234 wild-sourced shells, 155 live, captive-bred specimens and 10 carvings (primarily wild-sourced) according to importers. Re-exporters only reported the export of three live specimens and one shell. The majority of re-exports were traded for commercial purposes.

Table 3. Direct trade in *Tridacna gigas* from the Solomon Islands, 2000-2010 (all trade reported by importers). (No trade was reported in 2010.)

Term	Source	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
live	W	11	4	12	5	6	8					46
	C	61	1	404	12	30					200	708
	F		200	1	16							217
shells	W					106	100		319	616	611	1752
	C				5							5
	F							20				20

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Mingoa-Licuanan and Gomez (2002) reported that prices between USD 25 and USD 45 were paid for live juveniles in the aquarium trade.

Management: The trade and export of wild-sourced specimens was reported to be banned in the Solomon Islands (Solomon Islands Consolidated Legislation, 1996), however the trade and export of farmed specimens is permitted (Solomon Islands, 2009). Subsistence harvesting is not regulated, which was considered to threaten particularly the populations of *T. gigas*, along with *T. derasa* (Green *et al.,* 2006). It was reported that traditional management practices may exist in some areas (Kinch *et al.,* 2006), and the species was often found in village clam gardens (Hviding, 1993). Further details are provided in the genus overview.

T. gigas was initially regarded as a species particularly suitable for meat production in mariculture due to its robustness and quick growth, (SPC Aquaculture Portal, 2009). However, an economic analysis by Hambrey and Gervis (1993) suggested that village-based farming of *T. gigas* for meat in the Solomon Islands may be economically unviable due to the high initial investments needed, long growth period and high production and marketing risks.

In trials, implemented in 1989-1992 in 40 coastal villages in the Solomon Islands, *T. gigas* delivered to the villagers for grow-out at the size of 34.6 mm shell length and with a mean age of 380 days, were considered of a suitable size for the aquarium market 297 days later, at 77.6 mm shell length (Bell *et al.,* 1997). As a result of the trials, Bell *et al.* (1997) saw good potential in the development of economically profitable village-based production of *T. gigas*.

Since the establishment of small-scale farming programmes for rural communities by the WorldFish Center during the 1990s, hatchery-reared juvenile *T. gigas* was reported to continue to be supplied to farmers in the Western Province who then tended the clams during the grow-out stage (Horokou *et al.,* 2010). After grow-out in the villages, these specimens were sold to the company Aquarium Arts, which exported specimens for the global marine aquarium trade (Horokou *et al.,* 2010). In 2007, the Solomon Islands was reported to have produced 4300 individuals of cultured *T. derasa* for the aquarium trade, with an estimated national export potential of 15 000 cultured individuals (Kinch and Teitelbaum, 2010).

Tridacna maxima (Röding, 1798): Solomon Islands.

Biology: *Tridacna maxima* commonly reaches 25 cm in shell length, with a maximum size of 35-40 cm (Raymakers *et al.,* 2003; Kinch and Teitelbaum, 2010). The species reaches sexual maturity as a male and as a hermaphrodite at 2 years of age (Raymakers *et al.,* 2003). Annual rate of growth in India was reported to reach 8-11 mm per year in the juvenile stages, becoming slower and stochastic in the older individuals (Apte *et al.,* 2004). Based on a study in India, Apte *et al.* (2004) estimated that for successful recruitment, the minimum density of adult individuals should be at least 60-100 adult individuals per hectare.

Preferred habitats were reported to include lagoons and seaward reefs, where the species is found burrowed in coral and rubble, sometimes also found on sandy beds (Newman and Gomez, 2000). Typical depths were reported to vary from shallow to 20 m (Kinch and Teitelbaum, 2010).

Distribution in range State: *T. maxima* was reported to have the widest range of all *Tridacna* spp., occurring from East Africa to the Red Sea, eastern Polynesia and Japan (Munro and Heslinga, 1982; Ellis, 1999; Othman *et al.,* 2010).

The species was considered widespread in Solomon Islands (Govan, 1988; Hviding, 1993; Wells, 1997). In a survey of key invertebrate species conducted at 66 sites in the main island group of the Solomon Islands, Ramohia (2006) found *T. maxima* to be the second most widely distributed bivalve species, occurring at 53 per cent of studied sites.

Population trends and status: *T. maxima* was considered to be "reasonably abundant" throughout its range, although its status in the Indian Ocean was poorly known (Wells, 1997). The species was categorised as Lower Risk/conservation dependent in the IUCN Red List, although it was noted that the assessment needed updating (Wells, 1996c).

In Rapid Ecological Assessment (REA) surveys in the Solomon Islands, where approximately one hectare was surveyed in each of 59 locations in the main island group, *T. maxima* was found to be the most abundant Tridacnidae species, together with *T. squamosa* (Turak, 2006). In a related survey of key invertebrate species conducted at 66 sites in the main island group, Ramohia (2006) found *T. maxima* to be the most abundant Tridacnidae species at an average density of 28 individuals per hectare. However, these densities were considered "very low", compared to densities reported in other studies in Solomon Islands and other countries (Green *et al*., 2006). Ramohia *et al.* (2005a) recorded *T. maxima* densities of up to 167 individuals per ha in the Maravaghi community-based MPA in Nggela in Central Province.

Ramohia (2004) found *T. maxima* to be the second most abundant Tridacnidae species in transect surveys conducted in 2004 in the Marapa and Simeruka MPAs in Marau Sound, Central Province, noting that compared to other similar studies, the recorded densities were "very low". In related surveys conducted in the Sisili and Taburu community-based MPAs in Ngella in the Central Province, the recorded densities were again considered to be low compared to other studies (Ramohia *et al.,* 2005b).

Smith *et al.* (2000) found that the populations of *T. maxima* within and around the Arnavon Islands MPA in north-western Solomon Islands were increasing. However, Kinch *et al.* (2006) found the species to occur in low numbers in the Marovo Lagoon in the Western Province and Hviding (1993) considered the species scarce in some areas where it had previously been common.

Threats: The main threats to *T. maxima* were reported to be overharvesting and trade for souvenirs (Apte *et al.,* 2004)**.** The species was reported to be in particular demand in the aquarium trade due to its favourable, bright mantle colour (Hart *et al.,* 1998;

Wabnitz *et al.,* 2003; Kinch and Teitelbaum, 2008).

Tridacna spp. were reported to be frequently used for subsistence purposes in the Solomon Islands (Horokou *et al.,* 2010), and Hviding (1993) considered *T. maxima* to be of medium importance as a food source.

Trade: As the Solomon Islands has not yet submitted a CITES annual report, trade figures are based on data submitted by importers. According to data in the CITES Trade Database, direct trade in *T. maxima* from the Solomon Islands reported by importers 2000-2010 primarily comprised live specimens, of which 57 per cent were wild-sourced, 17 per cent were captive-bred and 6 per cent were captive-born (Table 4). In addition, small quantities of captive-bred and wild-sourced shells were imported in 2000 and 2005, respectively. Imports of live specimens increased overall between 2000 and 2005, but from 2006 onwards no trade in wild specimens was reported.

Table 4. Direct trade in *Tridacna maxima* from the Solomon Islands, 2000-2010 (all reported by importers). (No trade was reported in 2006, 2007, 2008 or 2010.)

Term	Source	2000	2001	2002	2003	2004	2005	2009	Total
live	W	453	162	721	2	2202	2038		5578
	C	537	314	789	119	1517		350	3626
	F		350	37	202				589
shells	W						100		100
	C	21							21

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Indirect trade in *T. maxima* from the Solomon Islands over the period 2000-2010 comprised 901 live specimens as reported by importers and 202 live specimens according to re-exporters. No re-exports of *T. maxima* originating in the Solomon Islands have been reported since 2006.

In the aquarium trade, the species was reported to fetch higher prices than other *Tridacna* species, USD 25-249 for individuals 4-13 cm in size (Solomon Islands Consolidated Legislation, 1996).

Management: The trade and export of wild-sourced specimens is banned in the Solomon Islands (Solomon Islands Consolidated Legislation, 1996), however trade and export of farmed specimens is permitted (Solomon Islands, 2009). Subsistence harvesting is not regulated (Green *et al.,* 2006), but it was reported that traditional management practices may exist in some areas (Kinch *et al.,* 2006). The species is also kept in village-based clam gardens, although not as commonly as *T. gigas* (Hviding, 1993).

In large-scale grow-out trials conducted in 11 village farms in the Solomon Islands, *T. maxima* reached a mean size of 7.84 cm (±1.49 s.d.) in 19 months with a survival rate of 38.9 per cent (± 16.6. s.d.) (Hart *et al*., 1998).

Tridacna squamosa Lamarck, 1819: Solomon Islands.

Biology: *Tridacna squamosa* commonly reaches 30 cm in shell length, with a maximum of 40-45 cm (Raymakers *et al.,* 2003; Kinch and Teitelbaum, 2010). It was found to reach sexual maturity as a male at 4 years of age, and as hermaphrodite at 6 years (Raymakers *et al.,* 2003). The species was reported to have a unique appearance, with blade-like scales of varying colours in its shell (Kinch and Teitelbaum, 2010; Lukan and Brough, 2011b).

T. squamosa is often found attached to the surface of coral reefs, preferring protected habitats, where it may be found from shallow water up to 20 m in depth (Kinch and Teitelbaum,

2010).

Distribution in range State: *T. squamosa* was reported to range across the Indo-Pacific region from the Red Sea and East Africa to the Pitcairn Islands (IUCN, 2006e), and up to Japan in the north (Othman *et al.*, 2010). It was considered widespread in the Solomon Islands (Govan, 1988; Hviding, 1993; Wells, 1997). In a survey of key invertebrate species conducted at 66 sites in the main island group of Solomon Islands, excluding the remote islands and atolls, *T. squamosa* was found to occur in 67 per cent of the surveyed shallow habitat sites, and some deep habitat sites, being the most widely distributed bivalve species (Ramohia, 2006).

Population trends and status: *T. squamosa* was considered to be "reasonably abundant" throughout its range, although it was noted that its status in the Indian Ocean is poorly known (Wells, 1997), and many populations in Southeast Asia were considered to be in decline (Othman *et al.*, 2010). The species was categorised as Lower Risk/conservation dependent in the IUCN Red List of Threatened Species, although it was noted that the assessment needed updating (Wells, 1996d).

In Rapid Ecological Assessment (REA) surveys in Solomon Islands, where approximately one hectare was surveyed in each of 59 locations in the main island group, Turak (2006) found *T. squamosa* to be the most common Tridacnidae species, along with *T. maxima*. However, in a survey covering the main island group, the average recorded densities of 15 individuals per hectare were considered low compared to other similar studies (Ramohia, 2006). In transect surveys conducted by Ramohia *et al.* (2005a) in the Maravaghi community-based MPA in Ngella in Central Province, *T. squamosa* was recorded in densities of 0-33 individuals per ha.

In the Marovo Lagoon in Western Province, *T. squamosa* was found to occur in low numbers (Kinch *et al.*, 2006). In transect surveys conducted in 2004 in the Marapa and Simeruka MPAs in Marau Sound, Central Province, Ramohia (2004) recorded five individuals during the study, with a mean density of less than two individuals per hectare, which was considered "extremely low compared to densities reported in other studies." In the Sisili and Taburu community-based MPAs in Ngella in the Central Province, Ramohia *et al.* (2005b) recorded three individuals in similar surveys.

Threats: *T. squamosa* was reported to be used for subsistence purposes in the Solomon Islands (Richards *et al.*, 1994; Horokou *et al.*, 2010). Hviding (1993) reported that the species was getting scarce in some areas where it had previously been common because it was used as "everyday food" by local communities.

T. squamosa was reported to be favoured in the shell trade due to its attractive colouring, appearance and suitable size (Wells, 1997; Lukan and Brough, 2011b). However, the prices paid for *T. squamosa* in aquarium trade were reported to be relatively low at USD 15-35 per individual (Mingoa-Licuanan and Gomez, 2002).

Trade: As the Solomon Islands has not yet submitted a CITES annual report, trade figures are based on data submitted by importers. According to data in the CITES Trade Database, direct trade in *T. squamosa* from the Solomon Islands reported by importers 2000-2010 principally consisted of live specimens, of which 66 per cent were captive-born or captive-bred and 35 per cent were wild-sourced (Table 5). However, no live imports of wild-sourced specimens have been reported since 2006. Conversely, imports of shells increased over the period 2000-2010, peaking at 1055 wild-sourced shells in 2008.

Table 5. Direct trade in *Tridacna squamosa* from the Solomon Islands, 2000-2010 (all reported by importers). (No trade was reported in 2006, 2007 or 2010.)

Term	Source	2000	2001	2002	2003	2004	2005	2008	2009	Total
live	W	140	552	343	417	422	438			2312
	C	262	822	506	314	700			200	2804
	F		200	325	1047					1572
shells	W						100	1055	364	1519
	C	15								15

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Indirect trade in *T. squamosa* from the Solomon Islands over the period 2000-2010 consisted of 402 live specimens as reported by importers (48 per cent wild-sourced) and 147 live specimens as reported by re-exporters (41per cent wild-sourced), all reported for commercial purposes. In addition, two wild-sourced specimens were reported imported for scientific purposes. The United States and Fiji were the only re-exporters of *T. squamosa* originating in the Solomon Islands. No re-exports have been reported since 2006.

Management: The trade and export of wild-sourced specimens was reported to be banned in the Solomon Islands (Solomon Islands Consolidated Legislation, 1996), however the trade and export of farmed specimens is permitted (Solomon Islands, 2009). It was noted that subsistence harvesting was not regulated (Green *et al.,* 2006), although traditional management practices may exist in some areas (Kinch *et al.,* 2006), and *T. squamosa* was reported to be often kept in village-based clam gardens (Hviding, 1993).

In two large-scale trials in coastal villages of the Solomon Islands, *T. squamosa* was found to have varying survival rates between seven and 83 per cent (Foyle *et al.,* 1997). The experiments, however, showed that the time required for growth to marketable specimens for the aquarium trade was relatively low at 5-7 months, and village-based farming of the species was considered economically feasible (Foyle *et al.,* 1997).

T. squamosa was previously selected for the Review of Significant Trade at the 20th meeting of the Animals Committee in 2004 (AC20 Summary Record). Solomon Islands was reported to be the only country not selected for the review that was exporting "significant quantities" of the species, and the exports were considered to be "of concern" (IUCN, 2006e). It was also noted that as the trade of wild-sourced specimens had been reported by importers, the nature of all specimens in trade should be verified (IUCN, 2006e).

D. Problems identified that are not related to the implementation of Article IV, paragraphs 2 (a), 3 or 6 (a)

The Solomon Islands became a Party to CITES in 2007 but have not yet submitted any annual reports.

Some trade in *Tridacna* spp. has been reported in the family and genus level, making the monitoring of trade in individual species difficult. Furthermore, the mixed reporting of units (specimens and weight, kg) makes it difficult to estimate the total number of specimens in international trade.

Importers reported moderate or significant quantities of trade in both wild-sourced and captive-bred individuals. Without any evidence found to the contrary, it is questionable whether the trade in captive-bred specimens met the controlled conditions as outlined in Resolution Conference 10.16 (Rev.).

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Annex: Key to Purpose and Source Codes

Source of specimens

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

Purpose of trade

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