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

Sixteenth meeting of the Conference of the Parties
Bangkok (Thailand), 3-15 March 2013

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Transfer of *Pristis microdon* from Appendix II to Appendix I of CITES

Pristis microdon qualifies for listing in Appendix I of CITES as it satisfies Criteria A.(i), (v); B.(i), (ii), (iii) and (iv); and C.(i), (ii) in Annex 1 of Resolution Conf. 9.24 (Rev. CoP15).

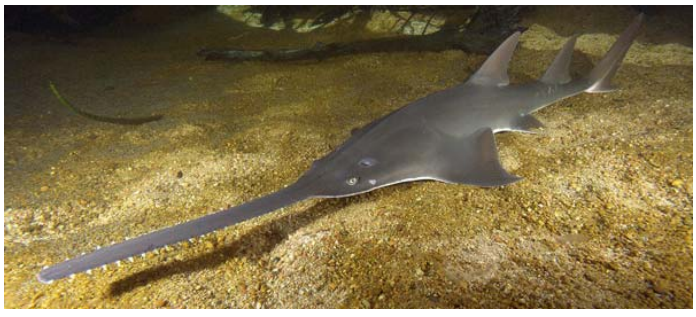
Australia has determined that this species meets the listing criteria for Appendix I, due to the historical range decline, inferred and observed decreases in area of distribution and numbers of individuals resulting in fragmented populations, combined with its vulnerability to intrinsic (its restricted life history parameters) and extrinsic (ongoing multiple threats including susceptibility to bycatch due to its morphology) factors.

While Australia previously held the view that northern Australian populations could sustain a limited number of removals for the aquaria trade, recent genetic analysis has shown that Australia's populations of freshwater sawfish are more vulnerable to such removals than previously thought, particularly females, due to strong female philopatry, which divides the Australian populations into several sub-populations that are unlikely to be replenished from other populations.

Listing freshwater sawfish on Appendix I will align this species listing with all other Pristidae species, ensuring maximum conservation benefit for this family and ensuring easier enforcement of all listings of this family and reducing the ability for 'look-alike' or illegal trade.

B. Proponent

Australia[1]



C. Supporting statement

1. Taxonomy

1.1 Class: Chondrichthyes

1.2 Order: Rajiformes

1.3 Family: Pristidae

1.4 Genus, species or subspecies, including author and year: *Pristis microdon* (Latham, 1794)

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

1.5 Scientific synonyms: *Pristis leichhardti; Pristiopsis leichhardti* (Whitley, 1945 north Queensland); *Pristis pristis* (Faria *et al*, in press).

1.6 Common names:
English: Freshwater sawfish, Leichhardt's sawfish, great tooth sawfish, large tooth sawfish, (small tooth sawfish in Australia).
French: Poisson-scie.
Spanish: Pejepeine, Pez Sierra.

1.7 Code numbers: None.

2. Overview

Pristis microdon populations have suffered severe declines since the 1960s and is considered to be locally extinct throughout much of its former range (including considerable parts of its former Indo-West Pacific range). Fragmented populations found in northern Australia are likely to comprise a high proportion of the remaining global population and the region therefore represents a globally significant area for the species (Stevens *et al.*, 2005).

Pristis microdon is vulnerable to both intrinsic and extrinsic factors. Species in the family Pristidae are among those marine fishes with the lowest productivities which make them particularly vulnerable to excessive mortality and rapid population declines. The main global threats to *P. microdon* are overfishing and significant habitat modification and destruction. More specific threats have been identified in a number of range States including from inshore gillnet and longline fisheries, fish and prawn trawl fisheries, recreational fishing, Illegal, Unreported and Unregulated (IUU) fishing, and impacts on habitat from modification of water flow (dams, weirs and barrages), mining and agricultural operations. In northern Australia the principle threats are fishing activities, including illegal, unreported and unregulated fishing, bycatch in commercial fisheries and recreational and Indigenous take; habitat modification; and destruction of coastal and freshwater habitat. Due to remoteness of the region, it is extremely difficult to determine the cumulative impact of all sources of mortality.

In 2007, the 14th meeting of the CITES Conference of the Parties agreed to list all sawfish species on Appendix I. This listing was modified by Australia to have *P. microdon* included on Appendix II because it was thought that populations in Australia were sufficiently robust to support a small harvest for the purposes of providing animals to recognised public aquaria. However, new information from genetic studies (Whitty *et al*., 2009; Phillips *et al*., 2009; Phillips *et al*., 2011; Phillips, 2012) has shown that *P. microdon* display strong sex-biased dispersal patterns, with females exhibiting patterns of natal philopatry while males move more broadly between populations. This means that any reduction in female abundance in one region is not likely to be replenished by migration from another region. Thus, the population is fragmented into subpopulations, with limited opportunity for re-establishment. Considering these findings, coupled with a lack of quantitative data on the cumulative impact of all threats to the Australian population, Australia now considers that the export of *P. microdon* may have a detrimental impact on the survival and recovery of this species and hence no longer allows any exports under the CITES provisions. Australia therefore now strongly supports the listing of this species on Appendix I of CITES.

3. Species characteristics[2]

3.1 Distribution

Pristis microdon is considered to occur/have once occurred in the Indo-West Pacific (Compagno *et al*., 2005; Compagno and Last, 1999; Last and Stevens, 1994, 2009) including Indonesia – Arafura Sea, west, east and central Kalimantan, Indragiri River near Rengat, Sumatra and the Java Sea (at least historically); Papua New Guinea - Fly River system, Sepik River, Laloki River and Lake Murray; Malaysia - Kinabatangan, Perak and possibly Tembeling and Linggi Rivers; Thailand - possibly from Mae Nam Chaophraya River at Nantauri and above Paknam; Cambodia – Grand Lac; Philippines – Luzon (Laguna de Bay, Bikol River and Camarines Sur Province), Lake Naujan, Mindoro, Mindanao (Rio Grande and Liguasan Swamp, Cotabato Province, and Agusan River at Moncayo, Davao Province); Myanmar and India - Ganges and Brahmaputra. The occurrence of *P. microdon* in Sri

[2] *There has been a recent revision of the Pristidae family and the scientific name of Pristis microdon may change Pristis pristis however at this stage this work has not been published: Faria et al, in press*

Lanka, Pakistan, Oman, the Red Sea, Madagascar, Mozambique, and Zimbabwe is dependent on the taxonomic understanding of the genetic relationship with other pristid species (Last and Stevens, 2009).

Greatest certainty regarding the occurrence of *P. microdon* exists in Australia. *Pristis microdon* occurs in northern Australia (i.e. Western Australia, Northern Territory and Queensland), where it has been recorded from rivers, estuaries and marine environments up to 100 km offshore and up to 400 km upstream (Figure 1; Morgan *et al*., 2004). The majority of records are of juvenile and sub-adult animals (<300 cm TL) taken from river systems.

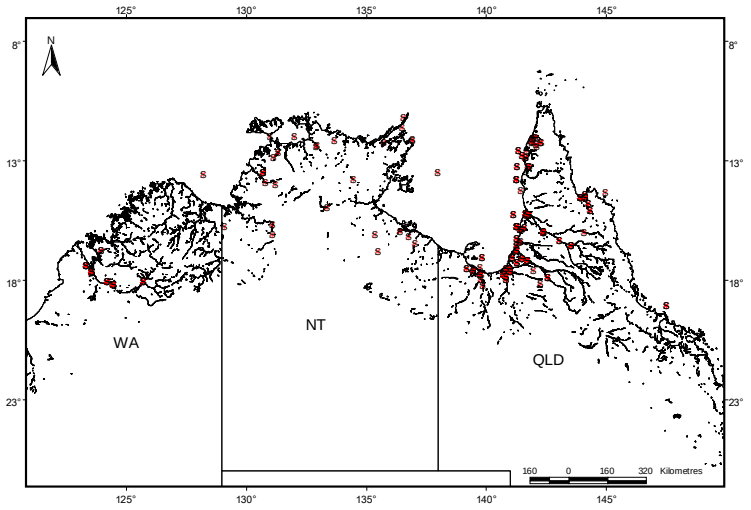

Figure 1. Map showing locations where freshwater sawfish have been recorded in Northern Australia. Data are from Giles *et al*. (2007), Peverell (2005) and Thorburn *et al.* (2003) [compiled in Morgan *et al*., 2004].

3.2 Habitat

Pristis microdon inhabits sandy or muddy bottoms of shallow coastal waters, river mouths, estuaries, freshwater rivers and isolated water holes. Adults have been recorded up to 100 km offshore on muddy substrates. *P. microdon* appears to have an ontogenetic shift in habitat utilisation with neonate and juvenile animals primarily occurring in the freshwater reaches of rivers and estuaries (Thorburn *et al*., 2007; Whitty *et al*., 2008). Of the few adults recorded, most have been recorded in marine and estuarine environments, with two pregnant females being recorded at river mouths, presumably to drop their pups (see Peverell, 2005).

In Australia, records of freshwater sawfish are mainly of juveniles from freshwater drainages and the upper reaches of estuaries (up to 400 km from the sea; Morgan *et al*., 2004). They are usually found in turbid channels of large rivers over soft mud bottoms more than 1 m deep, but they will move into shallow waters when travelling upstream or while hunting prey (Whitty *et al*., 2008). Thornburn *et al*. (2003) found that freshwater sawfish caught were most often associated with deeper sections of the river adjacent to a sand or silt shallow, such as a sandbar or shallow backwater. There are also indications of habitat partitioning for different size classes, with research suggesting that older age classes show a preference for deeper water (Whitty *et al*., 2008; Whitty *et al*., 2009).

3.3 Biological characteristics

Based on limited research undertaken in Australia, *P. microdon* are thought to occupy the freshwater reaches of large river systems as juveniles (up to seven years old); as sub-adults spend time in the estuarine environments, possibly alternating between the freshwater and near shore environments; and occupy mostly marine areas as adults (above 15 years old) (Peverell, 2008).

Females are thought to give birth to live young at the mouths of rivers and estuaries prior to, or during, the wet season. Neonate animals then move upstream into the freshwater reaches of rivers.

This upstream movement coincides with the wet season, and enables juveniles to move hundreds of kilometres upriver to areas that can only be accessed during wet season floods. There are few data on the reproductive capacity of *P. microdon* and there is considerable uncertainty around current estimates, particularly for females which are based on only two individuals. The smallest mature female was three metres and estimated to be eight years old. Chidlow (2007) reported up to 12 pups after a five month gestation period. It is uncertain whether female sawfish are capable of producing offspring annually or once every two years. As in other pristids, the reproductive mode is aplacental viviparity with lecithotrophic nutrition of the embryos (energy reserves come from the egg).

It is thought that pups are about 75-90 cm long at birth and adults have been known to grow up to over six metres in length (including rostra). Tanaka (1991) developed a von Bertalanffy growth model for specimens collected from Papua-New Guinea and Australia. Based on these calculations, it was determined that *P. microdon* grow about 18 cm in the first year. The maximum age of this species is unknown (the maximum recorded age is 28 years old) but, based on theoretical modelling of limited data it has been estimated to be about 80 years old. (Peverell, 2008).

Pristids feed on a variety of fish and crustaceans with the rostra being used to stun schooling fishes with sideswipes of the snout. Specimens of *P. microdon* collected from the Gulf of Carpentaria region have had barramundi (*Lates calcarifer*), northern saratoga (*Scleropages jardini*) and jewfish (*Protonibea diacanthus*) scales on the rostrum. In the Flinders River, Queensland, Australia, they have been observed congregating to eat freshwater prawn (*Macrobrachium rosenbergii*), and have been taken by fishers also targeting freshwater prawns using cast nets. Direct observations indicate that they primarily feed at night with animals observed feeding on mullet (*Mugil cephalis*) and oxeye herring (*Megalops cyprinoides*) in shallow (< 30 cm) water during the night and retreating to deeper pools during the day. Prawns (*Penaeus* spp), eel tailed catfish (*Plotosidae*), jewel fish (*Nibea squamosa*), mullet (*Rhinomugil nasutus*), threadfin salmon (*Polydactylus macrochir*) and *M. rosenbergii* have been found in the stomach's of dissected *P. microdon* (Peverell, 2008). Stable isotope analysis indicated a broad diet in the Fitzroy River, Western Australia, with fork tailed catfish (*Arius graeffei*) and *M. rosenbergii* being important (Thorburn, 2006; Thorburn *et al*., 2007).

3.4 Morphological characteristics

Pristis microdon has the following key characteristics (based on Compagno and Last, 1999; Last and Stevens, 2009):

- a large, slender shark-like body;
- head flattened with a broad blade-like snout or saw (rostrum) with 17 - 24 (mainly 20 - 22) evenly spaced teeth that start near the base of the rostrum and are not noticeably closer together at the tip;
- gill openings positioned on ventral surface;
- pectoral fins distinct, broadly triangular and with a straight posterior margin;
- dorsal fins tall and pointed with first dorsal-fin origin well in advance of the pelvic-fin origin;
- caudal fin with a short but distinct lower lobe (much less than half the length of the upper lobe).

3.5 Role of the species in its ecosystem

This species is a high order predator in riverine environments, and while consuming a wide range of prey types predominantly feeds on bony fishes (Thorburn, 2006). Adults are likely to be important predators of teleost fish and peneaid prawns in coastal marine ecosystems.

4. Status and trends

4.1 Habitat trends

As it is a wide ranging species, it is not possible to detail the specifics in changes to the habitat of *P. microdon* across its range. However, considering the species range extends across large parts of the Indo-West Pacific and encompasses regions of rapid population growth, it is likely that available habitat has not only declined in size but also in quality. Changes to the habitat would include impacts from agriculture, urban development, dam construction, channel dredging, boating and the diversion

of freshwater run-off. There are also a number of proposals to expand mining operations in northern Australia that affect river systems where the sawfish is found.

4.2 Population size

There are no estimates of population size for *P. microdon* across any part of its range.

4.3 Population structure

The population structure of *P. microdon* was investigated by Phillips *et al*. (2008, 2009, 2011, Phillips 2012). This investigation was based on the analysis of nucleotide sequence variation in the mitochondrial genome (which is maternally inherited) and information on allele frequency information at seven tetranucleotide microsatellite loci (which is bi-parentally inherited).

The results of the mitochondrial DNA analysis (maternal line) indicated the population of *P. microdon* from the Gulf of Carpentaria (north-east coast) was genetically distinct from animals on the west coast of Australia (Fitzroy River) (Phillips *et al*., 2008, 2011). The results of the preliminary microsatellite analyses (bi-parentally inherited) found no evidence of genetic subdivision in *P. microdon* between the Fitzroy River on the west coast of Australia and the Gulf of Carpentaria (Phillips *et al*., 2009). Recent data (Phillips, 2012) suggests that matrilineal structuring is also found at relatively small spatial scales within the Gulf of Carpentaria region (e.g. this region contains more than one maternal 'population'), although the precise location and nature of population boundaries could not be fully elucidated. The apparent difference in the amount of genetic structuring using markers with different modes of inheritance (maternal versus bi-parental) suggests that *P. microdon* may have male-biased dispersal, where females are strongly philopatric (remain or return to their birth place) and potentially natal philopatric, with independent maternal assemblages over relatively small spatial scales and males are more wide ranging (Phillips *et al*., 2009, Phillips, 2012). Additional samples are required to confirm these findings because the variance in the degree of differentiation at microsatellite loci can be quite large.

While the dispersal of female *P. microdon* is believed to be effectively philopatric, the results of population structure analyses using data from seven microsatellite loci (bi-parentally inherited) indicate that assemblages across northern Australia are genetically homogenous (Phillips, 2012). The combination of the results for the mitochondrial DNA and microsatellite analyses is generally indicative of male-biased dispersal. Phillips (2012) also notes that the presence of male gene flow between assemblages in Australian waters suggests that a decline (e.g. removal) of males in one location could affect the abundance and genetic 'health' of assemblages in other locations. Therefore, the take of males from the Gulf of Carpentaria (for the aquaria trade for example) could have an impact not only on the Gulf of Carpentaria assemblage(s), but also those found along the north and west coasts of Australia. However, Phillips (2012) then notes that the movement of a small number of males each generation could result is the assemblages appearing genetically homogenous.

Male biased dispersal is also found in other elasmobranch species (Feldheim *et al*., 2001, 2004; Keeney *et al*., 2005) where adult and juvenile habitat is spatially separated. These results imply that a decline in females at one location would not be replenished by the immigration of females from another location and that maintenance of overall genetic diversity throughout the species range is dependent on the movement of males. It also implies that a decline in the abundance of this species in either the west coast or the Gulf of Carpentaria could have a direct effect on its abundance in other regions (Phillips *et al*., 2011). Thus the population of *P. microdon* appears to be fragmented into a series of small subpopulations with limited opportunity for replenishment.

The overall levels of haplotype and nucleotide diversities in the control region of the mitochondrial DNA in *P. microdon* in Australian waters are not unusually low (e.g. within the range of values reported for other elasmobranchs including other species of *Pristis*) (Phillips *et al*., 2008, Phillips *et al*., 2009, Phillips, 2012). Since the evolutionary potential of a population is dependent upon the amount of adaptively-significant genetic variation therein, this finding is encouraging regarding the long-term survival of *P. microdon* populations in Australian waters. However, most of the control region diversity is present in rare haplotypes (i.e. in rare alleles), which would be highly susceptible to loss via genetic drift, particularly if the abundance of this species should decline in the future (Phillips *et al*., 2008). Also, it can take several generations for a decline in the genetic diversity of a long-lived species with overlapping generations, like *P. microdon*, to become evident, so it may be too soon to detect any long-term loss in diversity. More recent research (Phillips, 2012) has shown that there is a genetic signature of a historic bottleneck/founder effect event that has resulted in reduced levels of

diversity in *P. microdon* in Australian waters. While it appears that the event was historic (e.g. evolutionary timescale), the fact that such a strong genetic signature of the bottleneck/founder effect remains, suggests that this species may have also undergone contemporary declines in abundance that has prevented the recovery of genetic diversity.

4.4 Population trends

There is no empirical long-term data documenting population trends in *P. microdon* across any part of its' range. However, anecdotal evidence and records of sawfish landings in general suggest that globally, populations of all sawfish species - including *P. microdon* - have been extirpated or nearly extirpated from large areas of their former ranges. For example, a strong decline in the global landings of species in the Pristidae family has occurred since a global peak of 1759 metric tonnes in 1978 (FAO Fishery Information, 2012). Landings are now only recorded sporadically and in very small quantities in world fisheries (Figure 2). There is also increasing evidence of large scale disappearance and presumed extinction of *P. microdon* in parts of its Indo-West Pacific range (Compagno *et al*., 2006).

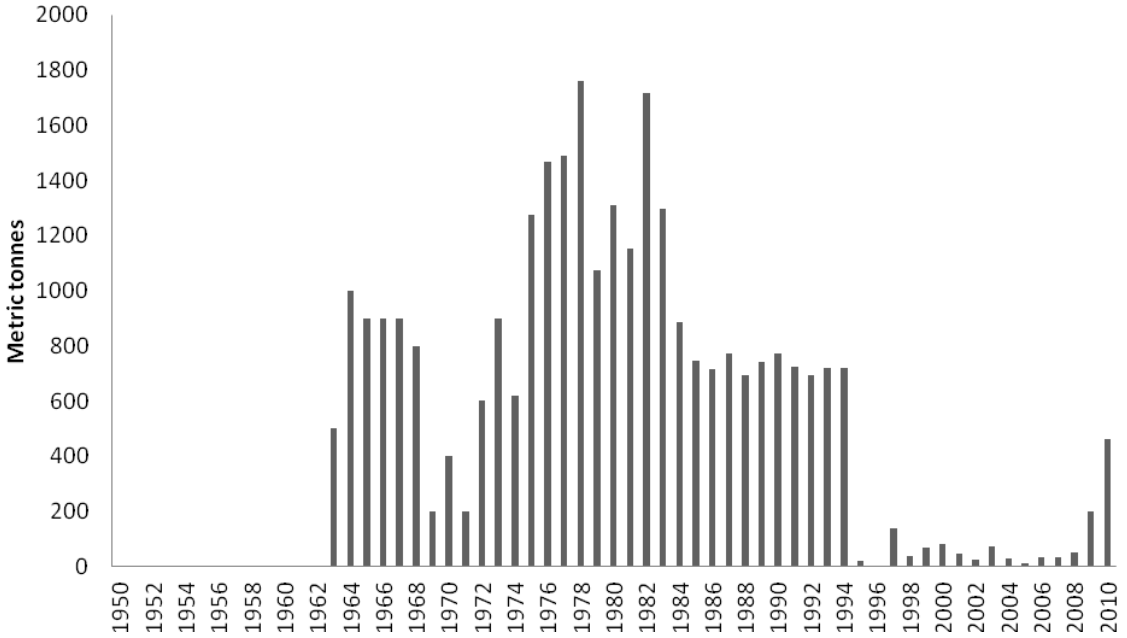

Figure 2. World landings (metric tonnes) of Pristidae, 1950-2010 (FAO Fishery information, 2012).

Australian populations of *P. microdon* also appear to have undergone a significant decline, although the magnitude of this decline is unknown and reliant on anecdotal evidence (Pillans *et al*., 2009). Despite these significant declines in *P. microdon* populations within Australia, Australian populations are probably the only remaining viable populations of this species in the world.

The evident declines of sawfish in general were recognised by an FAO ad hoc expert advisory panel which recommended all sawfish species be listed as Appendix I species (CITES, 2007) and is also acknowledged by the 'Critically Endangered' listing of all sawfish species on the IUCN Red List.

4.5 Geographic trends

There are numerous anecdotal accounts of sawfish declines throughout the world (CITES, 2007) but empirical evidence is generally lacking. However, the limited empirical evidence that does exist strongly confirms the anecdotal accounts of massive and rapid declines in sawfish numbers across their range. For example, sawfish were once reported as common by communities in Borneo in the 1970s but almost absent 20 years later (Manjaji, 2002). This is supported by empirical data collected in recent surveys of fish landing sites in eastern Indonesia between 2001 and 2005 in which more than 200 days of surveys were undertaken and over 40,000 elasmobranchs recorded. Of those 40,000 elasmobranchs, only two were sawfish, both *P. microdon* (White and Dharmadi, 2007). These two were large adults caught by tangle net fishers in the Arafura/Banda Sea region in the marine

environment and were suspected to have come from Australian waters. Dried rostra were observed at some Indonesian landing sites, but fisherman noted that they were caught 'many' years before and the species have not been seen in the last two decades.

Datasets from as early as 1963 to 1972 showed the considerable decline in batoids in the Gulf of Thailand (Pauly 1979) which included the virtual disappearance of sawfish (Pauly 1988). Declines in demersal fishes in the Thai Andaman Sea were also documented (Pauly 1979) and these likely included sawfishes.

The 'demise' of the species has been reported in Lake Sentani, New Guinea as a result of the change from traditional fishing methods to the use of gill nets (Polhemus *et al.* 2004) although these authors provide no further detail of this. Within the Cambodian Mekong system, numbers of *P. microdon* have reportedly decreased considerably. They were historically regularly seen as far upstream as Khoné Fall and in other areas of the Mekong (Tonlé Sap and Great Lake), but none have been seen for 'several decades' (Rainboth, 1996).

Data from the Queensland, Australia Shark Control Program, which operates 'bather protection' fishing gear along the Queensland east coast, shows a clear decline in sawfish catch (non species-specific) over a 30 year period from the 1960s, and the complete disappearance of sawfish in southern regions (Stevens *et al*., 2005) however the status (occurrence and extent of the population) of *P. microdon* on the east coast of Queensland is unknown.

There have been no confirmed sightings of *P.microdon* in South Africa since the 1990's and the species may be locally extinct[3].

5. Threats

The threatening processes impacting on *P. microdon* populations are numerous (Stevens *et al*., 2005; Pillans *et al*., 2009). Throughout the Indo-West Pacific region, the principle threats to sawfish species are artisanal, commercial and recreational fisheries, and large-scale habitat modification and destruction of coastal and freshwater habitat.

The long toothed rostra make sawfish particularly vulnerable to entanglement in fishing gear. Sawfish were previously actively targeted in fishing operations, but they are now predominantly taken as incidental catch. Although bycatch mortality is now the dominant fishing threat posed to sawfish populations, directed fisheries still remain in some regions to supply the public and private aquarium fish trade, and sawfish species may also be targeted opportunistically for meat and the shark fin trade. In a recent cumulative risk assessment of elasmobranchs in northern Australia, sawfish were identified as being the species most at risk, with gill net and trawl fisheries posing the greatest threat (Field *et al*., 2008; Pillans, 2007).

Habitat degradation and loss is also a major threat to sawfish species worldwide as the species are reliant upon very specific habitat types (e.g., mangroves, estuaries) for at least part of their lives. The agricultural and urban development of coastal zones has resulted in substantial loss, modification and degradation of these habitats.

International trade in *P. microdon* is now restricted under CITES (Appendix II listed species) and presently is only allowed to appropriate and acceptable aquaria primarily for conservation purposes. Since 1998, the aquaria trade is estimated to have taken 30 to 40 animals in Australia, with most of them being traded before the species were listed on Appendix II of CITES. In July 2011 the Australian CITES Scientific Authority for Marine Species reviewed the 2007 non-detriment finding for the export of *P. microdon* and found that it was not possible to conclude without a reasonable level of certainty that any harvest of *P. microdon* for export purposes would not be detrimental to the survival or recovery of the species (DSEWPaC, 2011). As a result of this finding, the international trade in freshwater sawfish from Australia has now stopped.

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3 *Information provided by South African Department of Environmental Affairs, 5 September 2012*.

6. Utilization and trade

6.1 National utilization

International trade in *P. microdon* is presently only allowed to appropriate and acceptable aquaria primarily for conservation purposes in accordance with the CITES annotation. Since the species was listed in 2007, nine live *P. microdon* specimens have been exported from Australia. In addition to these live specimens, one shipment of approximately 100 milligrams of sawfish ear bones has also been exported for scientific research purposes. Six of these specimens were exported to the United States of America; three were exported to the European Union. Prior to CITES listing on Appendix II, Australia issued permits for the export of 13 live animals during the period 2003 to 2006.

The Australian Northern Territory allows the collection of *P. microdon* for two domestic aquariums in the Darwin area. Specimens are usually collected from the Daly or Adelaide Rivers and placed on public display for a period of time (until they grow too large for the aquariums) and are then returned to their natal river[4].

6.2 Legal trade

It should be noted that Australia was the only country to trade in *P. microdon* under the current CITES provisions detailed above, but now, as a result of the recent review of the non-detriment finding (DSEWPaC, 2011), exports from Australia are no longer permitted.

6.3 Parts and derivatives in trade

Australia has permitted the export or re-export of three rostra since 2005 as household effects and approximately 100 milligrams of sawfish ear bones has also been exported for scientific research purposes.

6.4 Illegal trade

There is undoubtedly some illegal trade in sawfish rostra and fins. *Pristis microdon* have been identified in the catches of apprehended IUU fishing vessels. Live animals have also been released from illegal fishing nets by Australian fisheries inspectors.

6.5 Actual or potential trade impacts

An Appendix I listing will further restrict the trade of *P. microdon* for commercial benefit and potentially reduce demand for live sawfish or sawfish parts internationally.

As noted in the original proposal to list the whole Pristidae family on Appendix I of CITES (2007), enforcement provisions are more difficult when species are included in different Appendices due to the taxonomic uncertainty regarding the number of sawfish species, their similarity to each other, and the difficulty of distinguishing between parts in trade of different species.

7. Legal instruments

7.1 National

There are few range States which have enacted legislation to protect *P. microdon* or manage fisheries in which they are found.

A temporary ban on targeted fishing for fish in the Pristidae family in Lake Nicaragua was imposed by the Nicaraguan Government in the early 1980s (Thorson, 1982), after the population collapsed following intensive fishing in the 1970s. The aim of such a moratorium was to allow the population to recover, but the populations had not recovered 20 years later (McDavitt, 2002).

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[4] *Information provided by Dr Peter Kyne, Member – IUCN Shark Specialist Group; Charles Darwin University, Darwin, NT during comment period.*

India's Ministry of Environment and Forests has protected species in the family Pristidae under the *Wildlife Protection Act* (WPA) since 2001.

Indonesia has enacted legislation to protect species in the family Pristidae (and five other freshwater fish species) in Lake Sentani, West Papua, following severe depletion of populations in a gill-net fishery (Compagno et al., 2006).

Pristis microdon is listed as one of the endangered species under the *Malaysian Fisheries Act 1985 and Fisheries Regulations 1999* (*Endangered Fish Species*). It was last caught in September 2002.

In Myanmar, shark fishing is banned (Department of Fisheries Notice 2/2004) and there is a declared Shark Protection zone from Ross Island (12°13'N; 98°05.2'E) to Lampi Island (10°48'N; 98°16.1'E) in the Myeik Archipelago.

The Bangladesh *Wildlife (Conservation and Security) Act 2012* has *P. microdon* listed in Schedule I as a protected animal.

Pristis microdon is listed as 'vulnerable' under Australia's Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, *Pristis zijsron* and *Pristis clavata* are also listed as 'vulnerable' under this Act. *Pristis microdon* is protected under fisheries legislation in Queensland and Western Australia and cannot be retained by commercial or recreational fishers. Queensland does permit the live take of a limited number of specimens from the Queensland Gulf of Carpentaria for aquaria. The Australian Government is currently preparing a recovery plan for the three listed Pristidae species which will set out the research and management actions necessary to stop the decline of, and support the recovery of the species with the aim of maximising their long term survival in the wild.

In Australia's Northern Territory, *P. microdon* is listed as 'vulnerable' under the *Territory Parks and Wildlife Conservation Act 2000* and both recreational and commercial fishers are prohibited from retaining specimens without a permit. *Pristis microdon* is also listed as a protected ('no-take') species in the Australian state of Queensland under the *Queensland Fisheries Act 1994* and *Fisheries Regulation 2008* and in the Australian state of Western Australia as a 'Totally Protected Fish' under the *Fish Resources Management Act 1994*, focusing on threatened sawfishes and river sharks ('priority species') in northern Australia.

7.2 International

Pristis microdon is listed on Appendix II of CITES for the exclusive purpose of allowing international trade in live animals to appropriate and acceptable aquaria primarily for conservation purposes. *P. microdon* is also listed on the 2006 IUCN Red List as 'critically endangered'.

8. Species management

8.1 Management measures

There are very few specific management measures in place for *P. microdon* across most parts of its range. However, some countries do have controls and conservation measures in place (see sections 7.1 and 7.2). Australia has a number of management measures, which differ by state and territory and include restrictions on fishing, education campaigns and support of further research into their abundance, distribution and movement patterns. *Pristis microdon* is protected under Australia's Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*; as such, it is an offence to kill, injure, take, trade, keep, or move any individual without a permit in Commonwealth waters. In addition, all listed threatened species are considered matters of national environmental significance (MNES), and any action that may have an impact on a MNES must be referred to the minister responsible for the environment for assessment and approval. As yet there are no data to determine what level of incidental mortality is sustainable, or whether the aforementioned protection measures and management changes have reduced mortality to a level that is sustainable.

8.2 Population monitoring

With the exception of monitoring programs in Australia, no other monitoring programs for *P. microdon* have been identified. In Australia, long term monitoring of *P. microdon* abundance and size composition has been conducted in the Fitzroy River (Western Australia) from 2002 – 2007 (Whitty

et al., 2008) and limited tag/recapture projects are also being undertaken in Queensland to estimate juvenile numbers in a few river systems and isolated water holes. The Australian Government is currently funding a project that will develop innovative methods to assess the population status of data-poor, low abundance, rarely-encountered, threatened euryhaline and estuarine elasmobranchs in order to inform conservation and management of these species, with a focus on threatened sawfishes and river sharks in northern Australia.

8.3 Control measures

8.3.1 International: The only current control measure for this species at the international level is the CITES Appendix II listing. Additionally, it is listed as 'Critically Endangered' on the IUCN Red List.

8.3.2 Domestic: As stated previously, some countries do have management measures to control the take of this species, which include restrictions on fishing and trade. It should be noted that although there are levels of protection for this species in a number of range States, there is very limited information available on the effectiveness of these protection mechanisms.

8.4 Captive breeding and artificial propagation

No known captive breeding programs exist for *P. microdon* but *Pristis pectinata* pups were recently born in captivity at the Atlantis Paradise Island in the Bahamas (Atlantis Paradise Island, 2012).

8.5 Habitat conservation

In Australia, Marine Reserves and National Parks across northern Australia and on the Queensland east coast offer some protection from commercial and recreational fishing impacts, especially in parts of the Great Barrier Reef Marine Park and Kakadu National Park.

While marine parks in other countries are likely to exist in habitat which contains, or once contained, *P. microdon*, the extent of protection provided by these parks is unknown.

8.6 Safeguards

Pristis microdon populations are protected by one international agreement (listing on Appendix II of CITES) and by domestic laws in some countries (e.g., listed as a protected species in Australia).

9. Information on similar species

All sawfish species of the family Pristidae - except *P. microdon* - were listed on Appendix I of CITES at the 2007 14th meeting of the CITES Conference of the Parties.

10. Consultations

The Australian Government has consulted all CITES range States in relation to this proposal, each range State received and email and letter (sent on 10 August 2012) seeking their views on the draft proposal. A summary of responses received to date are provided below:

Bangladesh: Since this species holds critically endangered status globally on the IUCN Red List, domestically endangered and protected by domestic law, we agree with your proposal of inclusion of *Pristis microdon* in CITES Appendix I.

Malaysia: Ever since 2007, Malaysia have been supportive of the effort of listing this species into Appendix I as we believe that the species is considered to be critically endangered and require a collective effort among the range states in ensuring its survival.

Myanmar: Myanmar has no objective n proposal for inclusion of *Pristis microdon* in CITES Appendix I from Appendix II.

South Africa: With regard to support your proposal to transfer *Pristis microdon* from Appendix II to Appendix I of CITES, South Africa still needs to formulate its position regarding listing proposal for the

next meeting of the Conference of Parties to CITES. It is therefore not yet in a position to indicate support for the proposal.

United States of America: We find that the proposal provides clear and convincing information that indicates that freshwater sawfish stocks have declined significantly from pre-exploitation times, meet the CITES listing criteria (Resolution Conf. 9.24 [Rev. CoP15]) for Appendix I, and that this species would benefit from an Appendix I listing.

11. Additional remarks

In 2007 the 14th meeting of the CITES Conference of the Parties agreed to list all sawfish species on Appendix I. This listing was modified by Australia to have *P. microdon* included on Appendix II because it was thought that populations in Australia were sufficiently robust to support a small harvest for the purposes of providing animals to recognised public aquaria. However, new information from genetic studies (Whitty *et al*., 2009; Phillips *et al*., 2009, 2011; Phillips 2012) has shown that *P. microdon* display strong sex-biased dispersal patterns, with females exhibiting patterns of natal philopatry while males move more broadly between populations. This means that any reduction in female abundance in one region is not likely to be replenished by migration from another region.

Considering these findings, the fact that Australian populations of *P. microdon* have undergone significant decline (although the magnitude of decline is unknown and the fact that it is impossible at this stage to determine with any degree of certainty the cumulative impact of all sources of anthropogenic mortality) the Australian CITES Scientific Authority for Marine Species produced a revised non-detriment finding for Australian *P. microdon* in 2011. All available data suggest the Australian decline in *P. microdon* has been significant in population size, fragmentation, range retraction and that the species continues to be at risk from the impacts of fishing (commercial, recreational, Indigenous, domestic and international illegal unregulated and unreported fishing) and habitat modification. It is not possible to quantify the current rate of mortality for *P. microdon* in Australian waters and the species exhibits life history characteristics that indicate it is highly sensitive to impacts. As such, the Australian Scientific Authority for Marine Species concluded that it is currently not possible to conclude with a reasonable level of certainty that any harvest of *P. microdon* for export purposes would not be detrimental to the survival or recovery of the species.

The Australian 2011 non-detriment finding for *P. microdon* can be downloaded from the following web address: http://www.environment.gov.au/biodiversity/wildlife-trade/publications/ndf-freshwater-sawfish.html.

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