CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Inclusion of the Whale Shark (*Rhincodon typus)* on Appendix II of CITES.

B. Proponents

India and the Philippines.

Executive summary

- The **Whale Shark** (***Rhincodon typus***) is widely but apparently patchily distributed in warm tropical waters (excluding the Mediterranean) worldwide. The species is a plankton feeder, bears live young, and is the largest fish in the world (attaining up to 20 m in length and 34 t weight).

- ***R. typus*** is classified as **Vulnerable** by IUCN (http://www.redlist.org), based on past records of declining catches and abundance during and following targeted fisheries and in some unfished areas, likely slow recovery rates (by analogy with other shark fisheries), and the potential for similar declines to occur in future due to new and continued targeted and by-catch fisheries.

- Large sharks have K-selected life histories that make them especially vulnerable to exploitation: slow growth rate, reaching sexual maturity only after taking many years to attain a very large size, a long interval between pregnancies, and probable small populations. However, ***R. typus*** is poorly studied and many aspects of its life history remain unknown.

- All well-documented fisheries for large sharks have collapsed after relatively few years of intensive exploitation, with stock declines persisting long-term and recovery not occurring until decades after exploitation has ceased. Where data are available, fisheries for ***R. typus*** also indicate significant stock reductions occurring after only a few years.

- Traditionally, whale sharks were hunted for their liver oil, used for waterproofing traditional wooden boats. In recent years, demands for meat and fins increased, catering the international trade which becomes the main stimulus for new fisheries. Taiwan is the main known market for meat, but meat is presumably also valued by Chinese communities elsewhere, although lack of trade monitoring hinders identification of other consumer states. The huge fins are reported on sale in China, Taiwan and Singapore. Poaching has supplied unsuccessful attempts at illegal export of meat to Taiwan and Hong Kong from the Philippines where the species is protected.

- ***R. typus*** fins and fresh meat are readily identifiable in trade. A fin identification guide has been prepared to support an Appendix II listing of this species.

- Ecotourism operations based on ***R. typus*** viewing are underway or starting up in many parts of the world, including several developing countries. ***R. typus*** ecotourism is already a multi-million dollar industry (far more valuable than its fisheries) and has huge potential for further sustainable development. Unsustainable unmanaged fisheries may threaten non-consumptive ecotourism operations focused on a shared, migratory stock protected in some areas, but fished elsewhere.

- ***R. typus*** meets the criteria listed in Conference Resolution 9.24, Annex 2a, Bi, namely that 'it is known, inferred and projected that harvesting of specimens from the wild for international trade has, or may have, a detrimental impact on the species by exceeding, over an extended period, the level that can be continued in perpetuity'. The species also meets criterion in Annex 1, Ci & ii, namely that 'a decline has been either observed as ongoing or as having occurred in the past, and is inferred and projected on the

basis of levels or patterns of exploitation'. Finally, the low productivity and significant declines reported for this species indicates that it also meets FAO's recommended guidelines for listing of a commercially exploited aquatic species.

- This highly migratory species is only protected in isolated parts of its range and no fisheries have been sustainably managed. This Appendix II proposal will help to ensure that exploitation of this globally threatened species is regulated and monitored, and that international trade is not detrimental to the survival of ***R. typus*** and to the valuable ecotourism operations it supports.

- Due to the inevitable gaps in information for such a poorly studied fish, application of the precautionary principle (as defined in Resolution 9.24) is necessary. Listing on Appendix II will help to implement, in part, the FAO International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks). This IPOA, however, seems most unlikely to deliver regulation of whale shark fisheries or management or conservation of stocks in the foreseeable future. CITES presently offers the only established, effective means of monitoring international trade data at species level.

C. Supporting statement

1. Taxonomy

1.1 Class: Chondrichthyes (subclass Elasmobranchii)

1.2 Order: Orectolobiformes

1.3 Family: Rhincodontidae

1.4 Species: *Rhincodon typus* (Smith 1828)

1.5 Scientific synonyms: Primarily variant spellings: *Rhiniodon typus, Rhineodon typus* Smith, 1828; Genus *Rhinchodon* Smith; Genus *Rineodon* Müller and Henle, 1838; Genus *Rhineodon* Müller and Henle, 1838; Genus *Rhinodon* and *Rhineodon typicus* Müller and Henle, 1839; Genus *Rhiniodon* Swainson, 1839; Genus *Rhinecodon* Agassiz, 1845; Genus *Rhinodon* Smith, 1849.

Other synonyms: *Micristodus punctatus* Gill, 1865. *Rhinodon pentalineatus* Kishinouye, 1901.

1.6 Common names:

English:	Whale shark
French:	Requin-baleine
Spanish:	Tiburón ballena, pez dama (chequer-board fish)
Chinese:	[tofu shark]
Japanese:	Ebisuzame, Ching sha k'o, Jimbeizame-ka
Philippines (several dialects):	Butanding, balilan, iho-tiki, tawiki, tuki-tuki
Russia:	Kitovye akuly

1.7 Code numbers:

2. Biological parameters

2.1 Distribution

Whale sharks are found world-wide in all tropical and warm temperate seas except for the Mediterranean. They are occasionally recorded in oceanic waters but are most commonly reported in feeding aggregations close to the coast. Although widely distributed, they are generally infrequently recorded except in a few apparently favoured coastal areas, where they are usually

seen in relatively large numbers (tens to low hundreds) for only a few months of the year. Range states are listed in Annex 1.

Distribution records are characterised by highly seasonal appearances, with aggregations of whale sharks appearing for a few months in locations where their zooplankton food is abundant as a result of regular fish or invertebrate spawning events (Fowler 2000, Norman in press, Heyman *et al.* 2001). The species is certainly highly migratory, with satellite tracking of individuals demonstrating some very long-distance and long-term migrations, including a journey of over 2000km (at time of printing) toward Asia off the northwest Western Australian coastline in 2002 (Norman pers com), a 550 km journey completed within a few weeks (Graham and Roberts in prep), a 2,000km migration from the Mindanao Sea in the inner Philippines to 280km south of Vietnam in two months (Eckert *et al*. in press), and a 13,000km migration from the Gulf of California, Mexico, to near Tonga over 37 months (Eckert and Stewart 2001).

There appears to be spatial and seasonal population segregation, with animals of similar size and largely the same sex often reported in the same area (Norman 1999), while other age classes and a predominance of the other sex are found elsewhere (Eckert and Stewart 2001, Graham and Roberts in prep). By analogy with other large migratory sharks, different age classes and sexes may undertake different migrations. Thus, juveniles may have different migration patterns from mature fish, and mature males and females may also have migration patterns of different lengths over different distances. For example, migrations of mature females of some species are linked to breeding cycles which take two years to complete (Hueter 1998). Tagging and DNA studies have demonstrated that male white sharks migrate across ocean basins, while females tend to remain in the coastal waters of the continent where they were born (Boustany *et al*. 2002, Pardini *et al*. 2001). Despite undertaking such long distance migrations, tagging and photo-identification studies have demonstrated that individual sharks will return to the same feeding area in subsequent years (Taylor 1994, Norman 1999, Graham *et al*. in prep.). This philopatry has been described for many species of sharks (*e.g*. Walker 1996) and anadromous bony fishes.

2.2 Habitat availability

Habitat availability is not considered to be a constraint for this species, unless associated with seasonal food concentrations (nursery and mating grounds have not been identified). Critical habitats presumably include coral reefs (which are extremely vulnerable to habitat damage and disturbance) where whale shark aggregations are associated with synchronous spawning of corals (Western Australia) and fishes (Belize). Whale sharks are reported also to appear at Christmas Island following land crab spawning events (Norman 1999), and to frequent shallow-water areas near estuaries and river mouths in northern Borneo and the Philippines (Alava *et al*. 1997, Alava *et al.* in press, Alava and Kirit 1994), sometimes during seasonal shrimp blooms. The latter habitats are highly vulnerable to pollution, development and other human activities. Few seasonal whale shark habitats have been surveyed to assess extent, status and threats to their existence, nor the environmental factors which are important to this species.

2.3 Population status

The global status of the Whale shark is assessed as Vulnerable (A1b,d, A2d) in the *IUCN Red List of Threatened Animals* (Hilton-Taylor 2000 and http://www.redlist.org/). IUCN Criterion A, the basis for this assessment, refers to declining populations. Sub-criterion 1 indicates that population reductions have been observed, estimated, inferred, or suspected in the past, based on b) an index of abundance appropriate for the taxon [in this case declining landings or catch per unit effort] and d) actual levels of exploitation. Sub-criterion 2 indicates that a population decline is projected or suspected in the future, based on d) potential levels of exploitation (likely to occur if directed fisheries, driven at least in part by the demand for fins and meat in international trade, remain unmanaged, and as a result of by-catch). The Vulnerable assessment indicates that the estimated and projected scale of this population reduction is between 50% and 20% of the population over a

ten-year or three-generation period, whichever is the longer. (In this case, the generation period for the Whale Shark is conservatively estimated as 24 years.)

The IUCN status report for the Whale Shark (Norman in press, the basis for the IUCN Red List assessment) commences: *The life history of this relatively scarce but cosmopolitan tropical and warm temperate species is poorly understood, but it may be relatively fecund and certainly migrates extremely large distances. Catches have declined and populations have apparently been depleted in several countries by harpoon fisheries targeting localised concentrations of this huge, slow-moving and behaviourally vulnerable species. There is also incidental capture in other fisheries. Directed fisheries, high value in international trade, a K-selected life history, highly migratory nature, and low abundance make this species vulnerable to exploitation*.

There is no detailed study of Whale Shark life history; estimates of age at maturity range from 9 to over 20 or 30 years, generation time from 24 to over 60 years, and longevity from 60 to over 100 years (*e.g.* Wintner in press). Even if the most conservative (lowest) estimates are taken, this is a very low-productivity, low-resilience species. Calculating life history parameters using Fishbase (www.fishbase.org) and the 20m long shark reported by Chen *et al*. (in press b) yields an estimate of 0.08/year intrinsic rate of population increase (r).

Gestation period and interval between births are both unknown; only one litter of about 300 small near-term pups of 48-58 cm TL which grew rapidly in captivity has been reported (Joung *et al*. 1996, Leu *et al*. 1997). By analogy with the Nurse Shark *Ginglymostoma cirratum* (Castro 2000), the only other Orectolobid shark for which detailed reproductive data are available, pregnancy may last for less than a year, but birth is likely followed by a long resting period and litters born only every two years. This strategy might explain the small number of pregnant females observed. Initial rapid growth of pups (Leu *et al*., 1997) would explain the scarcity of records of very small Whale Sharks. Growth would slow rapidly at maturity (Pauly in press). A Whale Shark about 20m long and 34t in weight (as reported landed in Taiwan by Chen *et al*. 1997 and in press b) could be over 100 years old.

No estimates are available for the total global population of this species, although an 'Urgent Risk Assessment' project has been funded by the Australian government. To be completed by late 2002, this project will collate all available data on this species to model the population size (Norman pers com). Local estimates of population size are likely to be masked by the long-distance and long-term migrations which have been described by Eckert and Stewart (2001) and Eckert *et al*. (in press). Taylor (1994) used photo-identification and mark-and-recapture techniques over a period of several years at Ningaloo Reef, Western Australia, to reach an estimate of a population of low 100s of sharks using this reef following coral spawning events. Further photographic evidence of more than 100 individual sharks visiting the Western Australian coastline has since been collected (Norman pers com). Heyman *et al.* (2001) estimated that a population of 22-25 sharks regularly visited Gladden Spit, a small area of the Belize Barrier Reef to feed on reef fish eggs during spawning events, although 47 sharks have been photographed visiting this site. The removal of low 10s or 100s of Whale Sharks by local or regional fisheries followed by reduced catches (see below) appears to confirm, therefore, that only relatively small populations of this huge migratory species take part in known seasonal feeding aggregations, suggesting that the global population may also be small.

2.4 Population trends

There are several documented declines in seasonal catches by directed fisheries for the Whale Shark, with these declines having occurred in some areas over only a few years in relatively recent and short-lived intensive fisheries (see examples below for Philippines, Taiwan and India). Local populations have apparently declined drastically in some places, while fishing effort and price have greatly increased. Most of these fisheries are too recent and/or populations too poorly monitored to determine whether these declines would result in long-term (many decades) reductions in local

populations even if closed. This may well be the case, by analogy with other large sharks, as a result of low productivity and rebound potential and a lack of migration into the area of unfished stocks from other sources.

It is not known to what degree fishing in one area affects population(s) in other areas, although the fact that at least some of the sharks migrate long distances within ocean basins suggests that the effects may not be purely local. Thus a fishery in one may affect numbers sighted in another area or even in a different region. There is increasing concern that unexplained declines in numbers sighted seasonally in apparently unfished areas such as Thailand and South Africa could be the result of fisheries impacting these populations elsewhere. The rapid collapse of localised fisheries for this widely distributed and apparently seasonally migratory species could be explained by the tendency for whale sharks to be site-faithful (philopatric, as described above) and to return regularly to the same seasonal feeding locations. Despite their very wide-ranging nature, they are, therefore, effectively part of local stocks that are particularly vulnerable to depletion by fisheries activity.

China: A fishing gear called *Angshagou* (a spear to harpoon large sharks and set of hooks for lowering under the speared shark to bring it to the boat) was commonly used to capture large whale, basking and blue sharks in the 1960s. Two whale sharks were landed in 1995, but fishermen reported that this and other large species are now seldom caught (Parry-Jones 1996).

India: Small-scale harpoon fisheries traditionally existed in Pakistan and India for local utilization (Compagno in prep, Hanfee 2001); the species was harpooned in order for oil to be extracted from the liver (Rao 1986, Silas 1986, Prater 1941, Vivekanandan & Zala 1994). Demand in Taiwan stimulated a huge increase in effort and landings in the Veraval (Gujarat, India) fishery in the 1990s (Hanfee 2001), when the value of landed Whale Sharks increased steeply, particularly after Whale Shark meat began to be utilised in 1994. Prices were particularly high from 1997 onwards. Landings increased significantly in the late 1990s, with 279 whale sharks taken during the main January and May whale shark season in 1999. Despite continued high market demand and a possible increase in fishing activity the following year, the whale shark fishery appeared able to take only 160 whale sharks during the following season, January to May 2000. An additional 145 sharks were taken offshore (10-15km) in December 1999, well outside the normal seasonal fishery. The fishery closed in May 2001 when the Ministry of Environment and Forests legally protected the species in Indian territorial waters.

Maldives: Anderson and Ahmed (1993) note that fishermen were taking 20-30 Whale Sharks a year throughout the Maldives, using the liver oil to treat their boats. Local fishermen reported that numbers had declined significantly; a single atoll used to take 30 a year in the late 1970s/early 1980s. There has been no monitoring for possible population recovery since this fishery was closed in 1995.

Philippines: An artisanal subsistence harpoon or gaff fishery for Whale Sharks was initially pursued by a small number of former whaling villages in the Bohol Sea (Alava *et al.*1997, Alava *et al.* 1993; Barut and Zartiga in press). Very small numbers of Whale Sharks were taken for subsistence and a small amount of local trade. A subsequent increase in demand for whale shark meat in Taiwan stimulated the development of a targeted fishery for the species. Alava *et al.* (in press) describe the fishery from 1990 to 1997, during which period some 450-799 sharks were taken, averaging between 56-100 sharks per site per year in four of the primary fishing sites. This fishery peaked in 1993 when about 180 sharks were landed, then declined at an average of 27% per year in the following years. The catch per boat (the closest equivalent to catch per unit effort) in two of the traditional whale shark fishing villages in the Bohol Sea also declined steeply: from 4.4 to 1.7 sharks per boat in Pamilacan Island, Baclayon of Bohol province, and from 10 to 3.8 sharks per boat in Guiwanon, Talisayan of Misamis Oriental province. New Whale Shark fisheries were opened up in five other provinces in Visayas and Mindanao in order to meet demand for export to Taiwan, with catch averaging at 13 sharks per site in at least 11 sites in 1997. The Philippine government introduced legal protection for the species throughout Philippines waters in 1998 after poaching

occurred in a locally proclaimed whale shark sanctuary and ecotourism site in Donsol, Sorsogon. This protection has been hampered by continued demand for whale shark meat for export, which has resulted in poaching to supply Taiwanese and Hong Kong markets (see section 3.3). A significant decline in Donsol whale shark sighting rate, from 8 to 1-2 sharks per trip, was noted in 1998 and 1999, respectively (Groves 1999).

South Africa: Whale sharks occur seasonally (October to March) on the east coast of South Africa, mainly during the summer months (Bass *et al*. 1975). Numbers of reported strandings (declining according to Beckley *et al*. 1997) provide an indicator of abundance. More detailed information is available from aerial surveys undertaken by the Shark Research Institute from 1993-1998. This documented a significant decline in numbers of whale sharks sighted per hour, as follows: 1993/94: 7.26/hour; 1994/95: 1.58/hour; 1995/96: 0.96/hour; 1996/97: 0.97/hour; 1997/98: 1.62/hour (Gifford in prep.).

Taiwan: Demand for 'Tofu shark' has increased significantly in Taiwan (Province of China) during the past two decades. Chen *et al* (1996) report that a whale shark meat wholesaler estimated in 1995 that about 250 whale sharks were landed annually in Taiwan, close to their own estimate of 272 (158 as bycatch in set nets, 114 by harpoon). They expressed concern, however, that landings were declining, noting with Joung *et al*. (1996) anecdotal reports that captures south of Penghu (off the west coast) had declined significantly during the 1980s. Billfish harpoon fishermen from Hengchun Harbour fishing south of Penghu had reportedly landed some 50-60 whale sharks each spring in the mid-1980s, but landings had declined over the next decade until only about ten sharks were caught annually. Fewer than ten were caught in this area in 1994 and 1995. The most recent survey of the whole Taiwanese fishery (Joung per com), aided by the introduction of a government whale shark harvest reporting system, identified total catches of just 89 whale sharks throughout 2001 (38 by set nets, 36 in the billfish harpoon fishery and 15 by other methods). Chen 2002 reports that 94 Whale Sharks weighing about 104 t were caught in Taiwan during the 12 months from March 2001 to March 2002. It appears that the catch has declined by 60-70% in the seven years since surveyed by Chen *et al*. (1996).

Thailand: Whale sharks appear to have declined in Thailand; seasonal sightings by one diveboat operation fell from 45-60/year to just two in 1999 (Shark Research Institute 1999). There are not known to be whale shark fisheries in Thailand, but this migratory population could be depleted by fisheries elsewhere.

2.5 Geographic trends

The species is widely distributed in warm waters, but tends to be reported seasonally and mainly from the relatively few areas where sharks aggregate to feed on zooplankton blooms. At other times, populations may be dispersed or filter-feeding away from the surface, where they are less obvious. Whale sharks taking part in surface feeding aggregations are particularly vulnerable to targeted harpoon fisheries. As a result of their migratory but philopatric nature, whale sharks may decline in one geographic location when exploited by a fishery in another part of their range.

2.6 Role of the species in its ecosystem

The role of the Whale Shark in its ecosystem is unknown but, as a large plankton feeder, it may be similar to that of the smaller baleen whales. Although the species occasionally feeds on eggs released by spawning aggregations of reef fish (Heyman *et al*. 2001), this localised predatory activity is not considered likely to have a significant effect upon populations of the prey species (only a minute proportion of fertilised teleost eggs result in recruitment of adults to the population).

Whale sharks are known by traditional tuna fishermen to be associated with schools of tuna (Anderson and Ahmed 1993, Silas 1986, Au 1991, Waller 1996) and have been used as natural 'fish aggregation devices' by tuna purse seiners in the Pacific and Caribbean (*e.g*. Stretta *et al*.

1996). Predators include killer whale, *Orcinus orca* (O'Sullivan and Mitchell 2000) and, for juveniles, blue marlin and blue shark (Norman in press).

2.7 Threats

Sharks in general are more vulnerable to exploitation than most other fishes, because of their longevity, delayed maturation and relatively low fecundity (Camhi *et al.* 1998). Available evidence suggests that whale shark populations are, like those of other large sharks, very vulnerable to targeted fisheries (perhaps even more so, because they have so very few natural predators). Populations rapidly decline due to unregulated over-exploitation and, as described for other depleted shark populations, may remain low for many decades into the future. The main threat to whale shark populations is, therefore, from fishing operations – targeted and incidental or by-catch in other fisheries. Other threats are vessel collisions and, potentially, harassment by unregulated shark watching or diving operations (Norman 1999).

2.7.1 Directed fisheries

Targeted whale shark fisheries for fins and meat have taken place in several locations, including India, Pakistan, the Maldives, China, Taiwan (Province of China), Japan, Philippines, Indonesia, Malaysia and Senegal (Compagno in prep, Wolfson and Notarbartolo 1981, Rose 1996, FAO 1999, Joung *et al*. 1996, Silas 1986, Shark Research Institute 1999) using harpoons or gaffs, fish traps and set nets. Whale sharks are usually taken by target harpoon or gaff fisheries while swimming or feeding on the surface. Some of these fisheries are described in section 2.4 'Population Trends' above. The most recent Indian (Hanfee 2001) and Philippines fisheries (Alava *et al*. 1997, Alava *et al*. in press) were driven by demand for meat in Taiwan and Hong Kong. Legal protection in state waters may not be sufficient to protect stocks unless backed by regulation of the international trade demand which now drives illegal fisheries and export.

2.7.2 Incidental fisheries, boat strike and tourism

Whale sharks are caught as a bycatch in fish traps and set nets in many locations. In the Philippines, whale sharks caught in fish traps were originally released but captures were, for a brief period, killed for export when meat increased steeply in value (Compagno in prep) and before legal protection was implemented. Newman *et al*. (in press) report on bycatch in a trap fishery for tuna in Indonesia, where 18 whale sharks were captured during 11 months off Sulawesi.

Collisions appear to be a relatively frequent occurrence (*e.g.* Budker 1971) – missing sections of fin and large areas of scarring are often observed on the head and dorsal surfaces, although scarring heals very rapidly (Taylor 1994, Norman 1999).

Whale sharks are of growing importance for ecotourism. If unregulated, this activity has the potential to disrupt feeding patterns and to drive whale sharks away from critical seasonal feeding grounds. Management guidelines have, therefore, been developed for whale shark encounters in Australia and the Philippines in order to minimise disturbance to these sharks from boats and swimmers.

3. Utilization and trade

The lack of detailed fisheries landings records and trade data at species level, and for specific shark products, presents a major obstacle to determining precisely which products and what quantity are utilised nationally by fishing nations, and which enter international trade. Limited information, however, can be obtained from literature and TRAFFIC reports on the International Shark Trade.

3.1 National utilization

Liver oil: This was traditionally one of the most important products from whale shark fisheries, being used to waterproof artisanal wooden fishing boats in the Maldives (Anderson and Ahmed 1993), India (Hanfee 2001, Rao 1986) and other countries where traditional vessels are used (Compagno 1984). Taiwan and the Philippines either discard or use the liver for liver-oil extraction (Chen *et al*. 1996, Alava *et al.* in press).

Meat: Flesh of whale sharks was traditionally utilised locally in fresh, dried and salted form, and traded locally for food. In the Philippines, meat was classified into white and dark, sold fresh at PhP 8-10/kg (USD 0.16-0.2/kg) or dried at PhP10-100/kg (USD 0.2-20/kg) in 1997 (Alava *et al.* in press), increasing to PhP 800,000 (USD 16,000) for meat and body parts of one individual in 1998 (Pazzibugan 1998). Meat was recently sold at Rs 40-70/kg in India (Hanfee 2001). The Taiwanese whale shark fishery produces large quantities of fresh and frozen flesh for local markets, particularly in Taipei and coastal whale shark fishing harbours. The volume of whale shark meat sold through the Taipei wholesale fish market increased from February 1998 to August 2001 (Chen 2002), with wholesale prices falling from TWD 231.8/kg (USD 6.93/kg) to TWD 71.4/kg (USD 2.03/kg) over this period. Chen *et al*. (1996 and in press) reported that meat retailed at TWD 70-180 (USD 2.56-6.59) per kg in 1995 (compared with USD 1.83-2.93/kg for shortfin mako, the next most highly valued shark flesh). Mean retail prices fell by 20% from 1998 to 2001, to around TWD 400/kg (USD 11.70/kg, Chen 2002), still the highest price paid for shark meat in Taiwan. The meat is presumably also popular in China.

Fins: Fins were sold in the Philippines at Php400-500/kg (USD8-10/kg) or PhP1,700/set (USD 34/set), dry (Alava *et al.* in press). In Taiwan the fins are not considered to be of high quality (Chen 2002). Single very large whale shark fins were reported on sale in China for USD 15,000 each in 1999.

Cartilage, skin, stomach and intestines: There is no record of local utilisation of cartilage in whale shark fishing countries. It is either exported or discarded at sea. Chen *et al*. (1996 and in press), Hanfee (2001) and Alava *et al.* (in press) report that most other parts of landed whale sharks are used for food or medicinal purposes, either fresh, dried or salted (*e.g.* intestines), or sun-dried (skin, gills) in Taiwan, India and the Philippines. In the Philippines, dried gills were sold at PhP20-40/kg (USD 0.2-0.4/kg), skins at PhP10-15/kg (USD 0.2-0.3/kg) fresh or PhP50/kg (USD 1/kg) or PhP2,000/individual (USD 40/individual) dried. Whole head was often sold whole at PhP750-800 (USD 15-16) fresh, or PhP50-80/kg (USD 1-1.2/kg), dry. The jaws, traditionally thrown away, were later sold as trophies and curios at PhP1,000 - 8,000 (USD 20-60) per set (Alava *et al*. in press). In Taiwan, whale shark skin, gills and gill arches were smoked and served in a restaurant in May 2002 (Alava pers comm.).

3.2 Legal international trade

Four whale shark products probably enter international trade: liver oil (low value and probably not traded widely), fins, meat and cartilage. Chen *et al*. (1996, in press) and Hanfee (2001) note that cartilage can be dried, processed and exported from Taiwan and India for use in health supplements. Meat appears to be the most important of these products. Virtually no customs data are available on quantities of shark fin, cartilage or oil imports and exports by individual species. Most countries which keep any records of trade in sharks separately from other fish, combine all shark products into a single category (with the exception of Taiwan, where in March 2001 the Customs Authority established seven commodity codes for whale shark products). It is therefore very difficult to determine what volume of whale shark products enter international trade or the populations from which these products originate. The following information was obtained from literature and TRAFFIC surveys.

Fins: The fins have a very high value in some oriental markets, mainly because of their large size (they have been called *'Niou-Pyi Tian-Jeou* fin' (bogus giant fin) in Hong Kong (*Tian-Jeou* is the name for higher quality and more valuable basking shark fins). In June 1998, a single 1 m high shark fin, considered likely to be from a whale or basking shark, was on sale in a restaurant just outside Chengdu, Sichuan, China, for 80,000 yuan (slightly less than USD 10,000). In 1999 a single large whale shark fin was on sale in Beijing, China for 138,000 yuan (USD 16.600). A set of three whale shark fins (dorsal and two pectorals) was photographed on sale in a Beijing restaurant in November 1999 for over USD 72,000 (Anon 1999). Hanfee (2001) reports that a small number of fishermen in Gujarat, India, had been hunting the whale shark for its fins as well as its liver for some years, but that increased demand for whale shark fins in India arose in 1991.

Meat: Whale shark meat is of high value in Taiwan (see section 3.1 above), where domestic landings are reported to meet less than 50% of local demand (Chen 2002). This high value now appears to be driving international trade, and hence fisheries for this species. Certainly, the whale shark fishery in the Philippines (before legal protection of whale sharks here) developed from a localised artisanal subsistence fishery to a large scale fishery supplying meat for export to Hong Kong, Singapore and Taiwan from Cebu and Manila, and to Japan from Davao (Alava *et al*. in press, Reyes 1998, Luib 1998). Illegal exports of poached whale shark meat appear to be continuing (see below). The Indian fishery (Hanfee 2001) was also stimulated by the high prices being paid for whale shark meat in Taiwanese markets. Recent surveys in Taiwan suggest that, although total Taiwanese landings of whale sharks (formerly 250-300 sharks/year) have fallen, market size remains unchanged. This indicates increased levels of imports (TRAFFIC East Asia in lit.). Taiwan Customs records from March to November 2001 reveal no imports of Whale Shark meat, but record a single export of 2 t of whale shark meat to Spain.

3.3 Illegal trade

Whale sharks received strict protection in the Philippines in March 1998. In spite of the nation-wide legal protection, Taiwanese buyers continued to induce fisherfolks (*i.e*., the Bicol, central Luzon, Palawan, central and eastern Visayas regions) to hunt for whale sharks (Alava 2002). In Albay, whale sharks were either chopped up at sea and boxed to Paranaque (Manila) awaiting export at the Ninoy Aquino International Airport (Naia) or partially finned and trapped in fish cages or tied by the caudal fin to coconut trees in beaches awaiting inspection by Taiwanese fish brokers in September 1998 and March 1999 (Princesa, 1999). Whale sharks were also dynamite-blasted in Pangasinan (Padron and Hidalgo 2001, Fuertes 2001).

On 15 January 1998, 64 boxes with cargo listed as *lapu-lapu* (grouper) slipped through the Mactan-Cebu International Airport and loaded on a plane bound for Taiwan. Taiwanese authorities informed BFAR personnel in Cebu days later that the shipment contained whale shark meat instead of grouper. On 8 April 1999, the Visayas-based Presidential Anti-Organized Crime Task Force intercepted a ton of whale shark meat loaded in a 20-foot container also bound for Taiwan (Gallardo 1999). On 17 December 1998, Philippine authorities at the Ninoy Aquino International Airport (Naia) confiscated a shipment of 812 kg of whale shark meat in 23 boxes being air-freighted to Taiwan (consigned to the Tai Lieng Chuan Co. Ltd. in Taipei and documented as 'dogfish'). A further 1,992 kg of whale shark meat in 46 boxes of 'fresh fish' was intercepted at Naia on 12 January 2000, about to be airfreighted to Hong Kong and consigned to the Harvest Live (Seafood) Freight Co. (Nocum 1998 and 2000).

3.4 Actual or potential trade impacts

The recent rapidly increasing value of whale shark products in international trade (particularly meat and fins) has turned some incidental and traditional subsistence fisheries into targeted fisheries supplying the international market. In the Philippines, the traditional communal fishery practices were disrupted and gave way to an inequitable unsustainable commercial enterprise benefiting a few individuals. Historically non-whale shark fishery sites were started resulting to increased fishing

effort but decreased catch. Foreign fish trading companies and their local counterparts induced small fisherfolks to commit environmentally unsound practices prior to the legal protection of whale sharks and perpetrate illegal activities when the legal protection was set in place. Not only does this encourage the harvesting of incidentally captured animals that might otherwise be released alive, but it may also continue to encourage new, unsustainable whale shark fisheries in previously unexploited areas as declining fisheries in countries like the Philippines and India are closed down.

Ecotourism:

Impacts of trade may also have very significant and detrimental economic impacts on existing and potential high value, non-consumptive and sustainable ecotourism operations which could yield much larger and longer-term benefits to range states than short-term unsustainable fisheries. The longest-established ecotourism industry focused on whale sharks is based at Ningaloo Reef, Western Australia, where regulations control numbers of vessels and snorklers, contact time and approach distances in order to minimise disturbance to the sharks (Norman 1999). Some 1,000 people visited this site between March and June 1993 to see whale sharks. This increased to almost 3,000 in 1996 (Colman 1997), with the number of participants even greater in 2002 (Norman pers com). Newman et al. (in press) presented estimates of individual expenditure of AD 3,198 per person in 1995 associated with this activity and extrapolated this, based on 15% annual growth, to an industry worth around AD 12.8 million to the local and regional economy by 2000. They noted that overseas visitors comprised 65% of whale shark tour participants in 1996, and 76% in 1996.

A pilot whale shark ecotourism project in the Seychelles in 1996 investigated the potential for whale shark ecotourism in this state. Newman et al. (in press) calculated that this industry could be worth USD 3.95 to D 4.99 million per annum to the Seychelles, derived from a short season of just 14 weeks a year. The authors also calculated that whale shark tourism, based on live-aboard dive boats, could be worth a minimum of USD 3 million in the Phuket area of Thailand alone.

Whale shark ecotourism is actively being promoted in the Philippines as a non-consumptive sustainable alternative to the former fishery there, with similar regulations to those established in Australia (Alava *et al*. in press, Yaptinchay 2000, Yaptinchay et al. 1998, Yaptinchay and Alava 2000). The activity stimulated community development seen through economic benefits, local pride, increased opportunities and capacities in terms of livelihood, employment, projects, and businesses Whale shark interaction tourism in Donsol attracted over 1,700 people for the 1998-1999 seasons alone, with an estimated average revenue from tourists registration fees and boat rentals of about PhP 403,138 (USD 8,063) per year (Groves 1999; Alava 2002). This does not even include revenues from the transportation, food and housing sectors expected to provide a significant contribution to the local and national economy. At least four other sites outside Donsol have initiated whale shark ecotourism activities in their municipalities (*e.g.,* Talisayan in Mindanao, Leyte in Visayas, Pilar and Bacon in southern Luzon) (Alava pers com).

An important whale shark ecotourism industry has been established in the Gulf of California, Mexico, using spotter planes to direct boats to whale sharks. A small, newly established whale shark tourism industry in Belize netted at least USD 165,000 from boat tour fees in 2001, but is worth in the region of USD 1.5 million if whole trip costs are included in the estimate (Graham pers. comm.). Honduras is presumably also benefiting from whale shark tourism, and there are likely to be significant economic benefits also for other Caribbean countries, east African states (including South Africa, Mozambique, Tanzania and Kenya), and several Red Sea and Indian Ocean range states where dive tourism occurs.

3.5 Captive breeding or artificial propagation for commercial purposes (outside country of origin)

Unsuitable because of its large size and biology. Only a few immature specimens have been maintained in aquaria (Last and Stevens 1994).

4. Conservation and Management

4.1 Legal status

4.1.1 National

Australia: Protected in Commonwealth waters under the *Environmental Protection Biodiversity Conservation Act 1999* (EPBC Act 1999) as a listed migratory species, under the *Great Barrier Reef Marine Park Act* in those Queensland waters where it is known to occur, in the state of Western Australia by an "indefinite closed season" under the *Fish Resources Management Act 1994* and *Wildlife Conservation Act 1950*. Although not seen in Tasmania, the species is under the Tasmanian *Fisheries Regulations* 1996.

Belize: Gladden Spit, on the Belize Barrier Reef (the feeding ground for whale sharks in spring) was declared a marine reserve on May 18 2000, Decree No.68 of 2000. Whale shark tour regulations have been drafted and tour guides trained in these regulations, even though they have not yet been gazetted.

Honduras: A government decree (Presidential Decree No. 321-900) conferred full protection on the whale shark on 28 October 1999.

India: Following concern over the unregulated and likely unsustainable nature of the Indian whale shark fishery, the Indian Central Government's Ministry of Environment and Forests granted full legal protection to whale sharks in Indian territorial waters by adding the species to Schedule I of the Wildlife (Protection) Act, 1972, under sub section (1) of section 61, on 28th May 2001.

Maldives: Whale sharks have been fully protected in the Maldives since 1995 (Environment Law 4/93) in view of the declining population (attributed to the local fishery), important function in aggregating tuna schools, high value for ecotourism and the comparative low value of its fishery products.

Mexico: Whale shark Sanctuary under consideration for Bahia Los Angeles, Gulf of California.

Philippines: Fully protected since 1998 under Department of Agriculture Fishery Administrative Order No. 193, which prohibited "the taking or catching, selling, purchasing and possession, transporting and exporting of whale sharks and manta rays". (As noted above, some illegal exploitation and export has continued and there are difficulties with enforcement on the islands' extremely long coastline.)

South Africa: Full legal protection under consideration. Permits required for ecotourism or scientific interactions with whale sharks.

Taiwan: Common Commodity Codes assigned for seven Whale Shark products in order to monitor international trade in the Customs database. Taiwan could apply Article 11 of the *Foreign Trade Law* to regulate imports and exports, if the Whale Shark is listed on CITES Appendix II (Chen 2002).

Thailand: Protected through a fishery ban under Section 32 (7) of the *Fishing Act* B.E. 2490 on 28 March 2000.

United States of America: Fully protected in Florida State waters (out to the three mile limit on the east coast, and nine miles on the Gulf coast) and in Atlantic and Gulf of Mexico federal waters (3-200 miles) under the US Fishery Management Plan, which prohibits directed commercial fishing and landing or sale. This prohibition recognises the biological

vulnerability (limited reproductive potential and slow surface movements) of the species and was enacted in order to prevent targeted fisheries from developing.

4.1.2 International

Listed on Appendix II of the Bonn Convention for the Conservation of Migratory Species of Wild Animals in 1999. This identifies it as a species with an unfavourable conservation status (but not necessarily in danger of extinction) that would benefit from the implementation of international cooperative Agreements for its conservation and management (no Agreements are under discussion).

Included in the United Nations Convention on the Law of the Sea (UNCLOS) Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks as a highly migratory species, recognising that co-ordinated management and assessment of shared migratory populations would promote an understanding of the cumulative impacts of fishing effort on the status of shared populations. No such initiatives are known to be underway.

4.2 Species management

4.2.1 Population monitoring

Whale Shark photo-identification projects are underway in Australia (where over 100 individual sharks have been identified visiting Ningaloo Reef), Belize (47 sharks identified), the Philippines, Mexico (the Gulf of California) and USA (Gulf of Mexico). These projects enable naturally marked individuals to be re-identified and some have also produced estimates of local population numbers (ranging from dozens to low 100s).

Visual tagging of Whale Sharks (which may be used in the same way as photo-identification to calculate population size and site fidelity, provided that tag loss is minimised) is underway in KwaZulu Natal (South Africa) and southern Mozambique, the Seychelles, Australia, Caribbean (Belize and Honduras); possibly also in Mexico and the Philippines.

A wide range of biotelemetry techniques (including satellite, acoustic and archival tagging) is currently being applied to Whale Shark research in the Gulf of California, Philippines, Sabah (East Malaysia), Australia, KwaZulu Natal (South Africa) and Mozambique, Seychelles, Honduras, and Belize. These may be used to track whale shark migrations and determine to what extent migratory populations are shared by different range states.

4.2.2 Habitat conservation

4.2.3 Management measures

Other than the protection noted in countries above, there is no management of fisheries or populations.

FAO International Plan of Action for the Conservation and Management of Sharks

Management and monitoring of the whale shark and other species of sharks is theoretically required under the International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks), adopted by FAO in 1999. The objective of this FAO IPOA is to ensure the conservation and management of sharks and their long-term sustainable use. It notes that the current state of knowledge of sharks and shark fisheries practices causes problems in the conservation and management of sharks due to the lack of available catch,

effort, landings and trade data. *Inter alia*, the IPOA requires States that adopt the Plan (it is voluntary) to identify and pay special attention, in particular, to vulnerable or threatened species, and to facilitate the identification and reporting of species-specific biological and trade data. Progress with implementation of this wholly voluntary IPOA has been extremely limited since its agreement (see IUCN/TRAFFIC paper to the 18th Animals Committee meeting in 2002, AC18 Doc 19.2). This IPOA seems most unlikely to deliver regulation of whale shark fisheries or management or conservation of stocks in the foreseeable future.

CITES presently offers the only established, effective means of monitoring international trade data at species level.

4.3 Control measures

4.3.1 International trade
and
4.3.2 Domestic measures

No international control measures. No domestic control measures known other than those in 4.1.1.

5. Information on Similar Species

The whale shark has a very distinctive spotted appearance, and is unlikely to be confused with any other species. The fins of the adults are extremely large, have concave trailing edges and are rounded at the tips. For this reason alone, they are very unlikely to be confused with those of any other species when detached from the body. The meat is also distinctive, as it has a unique soft spongy texture and the myomeres (muscle fibres) are of exceedingly large size.

A CITES identification manual has been developed in Australia to assist in the identification of whale shark fins in international trade.

6. Other Comments

6.1 Range State consultations

Australia: Whale shark is most commonly seen off northern Western Australia, Northern Territory, Queensland and New South Wales and occasionally in Victorian and South Australian waters. (Comments on legal status in Western Australia and in Tasmania incorporated in 4.1.1). Little is known about the biology of the species as it is poorly studied. Whilst the species occurs at low population densities, there are consistent sightings within Australian waters. A lucrative ecotourism industry revolving around their annual appearance at Ningaloo Marine Park on the northwest coast of Western Australia is now well established. Research has thus far been unable to provide an estimate on population abundance, however, it is thought that numbers are declining. Overseas research shows that there has been a reduction on catches during and following targeted fishing. Whale Shark stocks have shown little resilience and have not recovered until decades later due to their slow growth and reproduction rate. In Australia there are no commercial fisheries targeting Whale Shark. There are no records of it being taken as bycatch species. An Appendix II listing will assist in the regulation and monitoring of exploitation of this species and ensure that international trade is not detrimental to the survival of the species and to the valuable ecotourism operations its supports. Australia supports the listing of *Rhincodon typus* to Appendix II. Attachments (*i.e.*, *Conservation Overview and Action plan for Australian Threatened and Potentially Threatened Marine and Estuarine Fishes* by J.J. Pogonoski *et al*. 2002 and the Whale Shark information from Environment Australia's Species Profile and Threats Database) available upon request.

Honduras: (Translation) The Office of the Secretary of Agriculture and Animal Industry being an authority on the CITES administration of Honduras since 1999, has realized the necessary suggestions which will be included in the Presidential Decree No. 321-900 for the protection of whale shark. Moreover, Honduras is one of the countries which is frequently visited by the whale shark in the Caribbean coast. Meanwhile it has already been one of the ecotourism attractions which has increased the country's various investments, more importantly for the diversification of our exports. Having read and analysed the importance of this proposal, the CITES administrative authority of Honduras, in view of its commercial value of the whale shark hereby considers the transfer of such species from classification III to II. Thus the Office of the Secretary of Agriculture and Animal Industry being responsible for the management of the CITES convention, supports the proposal of the change of the whale shark from classification III to classification II presented.

Mauritius: In the Mauritian context whale shark does not form part of the fishery and also, so far no studies have been carried on this species. As such, no significant information is available on whale shark in Mauritius. Hence, Mauritius is not in a position to give views concerning the proposal for the inclusion of the whale shark in Appendix II of CITES.

United States of America: The current proposal is substantially more detailed and persuasive than the proposal considered at COP 11 in Nairobi. It includes more information on the several fisheries around the world that have declined rapidly despite relatively small takes. Many of the relevant research studies on migration have now been published or are in press. Life history of the species is more fully and effectively described, and the cases for Appendix II status and need for precaution are well made. The case for international traffic is strong but circumstantial, except for Taiwan and the Philippines. This is to be expected, however, given that catches, landing, and shipments are not effectively regulated or monitored, but is not an excuse for inaction. Listing on Appendix II would allow these kinds of data to be collected, so that resource and trade management options can be examined before the depletion has gone too far. Although the United States submitted the proposal considered at COP 11, the US has not prepared a proposal for COP 12. The US, however, remain concerned about the status of the whale shark in international trade. Given the strength of the document submitted for review, the United States can support the proposal to list the whale shark on Appendix II of CITES. The US stresses, however, that upon official receipt of all proposals submitted to the CITES Secretariat for consideration at COP 12, a public process through which public input on the US draft positions for the COP 12 will be engaged through which an official COP 12 position on this and other proposals will be developed. The US also notes that it would be useful if the current preparation of an identification sheet by Australia can be confirmed.

Other range countries: Copies of the proposal for comments have been circulated by electronic mail, facsimile and express as well as regular airmail to almost all the range countries but received no comments and/or responses. Notices of email delivery failures were received for Argentina, Barbados, Cameroon, Colombia, Democratic Republic of the Congo, Jamaica, Madagascar, Mozambique, Myanmar, Panama, Peru, Saint Lucia, and Vanuatu. Attempts are still being done to re-send copies of the proposal to these countries.

7. Additional Remarks

7.1 Ecotourism and fisheries

As noted in section 3.4, recent ecotourism operations based on Whale Shark viewing are underway or commencing in Western Australia (Ningaloo Reef), KwaZulu Natal (South Africa), Mozambique, Philippines, Seychelles, Maldives, parts of the Caribbean, and Gulf of California (Mexico). Some of these operations already have a very high economic value. Ecotourism is a non-consumptive, sustainable use of this species which could potentially yield significant economic returns, particularly to developing range states with a high dependence on ecotourism income. This is, however, threatened by unsustainable fisheries underway in other parts of the range of shared whale shark populations. The requirement for non-detriment findings prior to international trade in

whale shark meat and other products would be of significant benefit to states wishing to develop whale shark ecotourism activities or to retain existing levels of such operations.

7.2 Assessment of the whale shark under the CITES biological criteria

This proposal for the listing of the whale shark on Appendix II of CITES is based on the following assessment of the species' biological status, using CITES Appendix II listing criterion B(i) (namely 'It is known, inferred or projected that the harvesting of specimens from the wild for international trade has, or may have, a detrimental impact on the species by: exceeding, over an extended period, the level that can be continued in perpetuity). It also meets Criteria Ci & ii in Annex I, namely that 'a decline has been either observed as ongoing or as having occurred in the past, and is inferred and projected on the basis of levels or patterns of exploitation'.

1. The species has been subjected to unsustainable fisheries in several parts of the world, including the Philippines, Taiwan, Maldives, and India. The data from these fisheries presented in the preceding pages indicate that catches (in some cases expressed as per unit effort) have fallen significantly over relatively short periods. For example, catches at various sites in Taiwan are variously reported to have declined by 30-90% from 1960s to 1980s; 50-80% from the mid 1980s to 1990s; and around 70% during the four years from 1997 to 2001. In the Philippines, catches declined at an average of 27% each year during the short-lived fishery in the mid 1990s. Two years of seasonal fishery data from Gujarat in India (1999 and 2000) appeared to indicate a 40% decline in landings, although the time series of data is so short that these results are inconclusive.

2. There are apparent declines in numbers of seasonal sightings in areas without fisheries, which may be due to unsustainable fisheries affecting migratory populations elsewhere in their range.

3. At least some of the main products of some of these fisheries (and in the case of the Philippines and India, virtually all of them) have entered international trade. Illegal exports of meat have been seized in the Philippines.

4. In recent years new whale shark fisheries and export markets have arisen purely as a result of the high value of ,and demand for, meat and fins in international markets.

7.2 Assessment of the whale shark under FAO's recommended criteria for CITES listing

The UN Food and Agriculture Organization (FAO) has carefully considered extinction risk for marine fishes, particularly in the context of CITES listings proposals. FAO (2000) notes that large, long-lived, late-maturing species, with both high and low fecundity (particularly the latter), that are vulnerable to exploitation are at relatively high risk of extinction from exploitation.

Productivity, or ability to sustain exploitation, is the single most important consideration when assessing population status and vulnerability to fisheries. Generation time is a useful surrogate for productivity. The most vulnerable species are those with an intrinsic rate of population increase (r) of < 0.14 and a generation time of > 10 years (FAO 2001). Population status data presented in section 2.3 above ($r = 0.08$, generation time = 24 to > 60 years) indicate that this species falls into FAO's lowest productivity category. It could, therefore, qualify for consideration for Appendix I listing under FAO's recommended guidelines if its population declined to 20% of the historic baseline (for very vulnerable species a lesser decline to 30% might be appropriate). Furthermore, FAO recommended that consideration for Appendix II listing would be appropriate if populations had been reduced to some 5-10% above the Appendix I extent of decline guideline, and that historical extent of decline and recent rate of decline be considered together when considering whether species qualified for consideration for an Appendix II listing.

It is, of course, very difficult to assess population size in relation to an historic baseline. FAO (2001) presents quantitative guidelines (reproduced below) for recent-rates-of-decline which, if met or exceeded, would lead to consideration for CITES listing. This species clearly qualifies for listing consideration on the basis of the population declines (using declining CPUE, landings and other data presented in section 2.4 as surrogates for population estimates) described in the preceding pages.

Current population as % of baseline for low productivity species	100%	90%	80%	70%	60%	50%	40%	30%	20%
Cumulative 10-year rate-of-decline (& average annual rate-of-decline) that would drive a population down from the current level to the extent-of-decline threshold (as a % of the specified baseline) within 10 years.	80% (15%)	78% (14%)	75% (13%)	71% (12%)	67% (10%)	60% (9%)	50% (7%)	33% (4%)	0%

Table adapted from FAO Fisheries Department 2001 (Table 2). *A background analysis and framework for evaluating the status of commercially-exploited aquatic species in a CITES context.*

8. References

See Annex 2.

Range states of Rhincodon typus

Angola
Antigua and Barbuda
Argentina
Australia
Bahamas
Bahrain
Bangladesh
Barbados
Belau
Belize
Benin
Brazil
Brunei Darussalam
Cambodia
Cameroon
Cap Verd Republic
Chile
China
Colombia
Comoros
Congo
Costa Rica
Cote d'Ivoire
Cuba
Democratic Republic of the Congo
Djibouti
Dominica
Dominican Republic
East Timor
Ecuador
Egypt
El Salvador
Equatorial Guinea
Eritrea
Ethiopia
Federated States of Micronesia
Fiji
France (New Caledonia, Reunion, French Polynesia and other South Pacific possessions; Clipperton Island; Guadaloupe, Martinique and other Caribbean possessions)
French Guiana
Gabon
Ghana
Grenada
Guatemala
Guinea
Guinea Bissau
Guyana
Haiti
Honduras
India
Indonesia
Iran
Iraq
Israel
Ivory Coast
Jamaica
Japan
Jordan
Kenya
Kiribati
Korea
Kuwait
Liberia
Madagascar
Malaysia
Maldives
Marshall Islands
Mauritania
Mauritius
Mexico
Morocco
Mozambique
Myanmar
Namibia
Nauru
Netherlands (Netherlands Antilles, Curacaçao and other Caribbean possessions)
New Zealand (including South Pacific possessions)
Nicaragua
Nigeria
Northern Marianas Islands
Oman
Pakistan
Palau
Panama
Papua New Guinea
Peru
Philippines
Portugal (Madeira, Azores, Macau)
Qatar
S. Tome and Principe
Saudi Arabia
Senegal
Seychelles
Sierra Leone
Singapore
Solomon Islands
Somalia
South Africa
South Yemen
Spain (Canary Islands)
Sri Lanka
St. Kitts-Nevis
St. Lucia
St. Vincent and the Grenadines
Sudan
Surinam
Swaziland
Tanzania
Thailand
The Gambia
Togo
Tokelau
Tonga
Trinidad and Tobago
Tuvalu
United Arab Emirates
United Kingdom (St. Helena, Ascension, Bermuda, Virgin Islands, Anguilla, Turks and Caicos, Monserrat and other Caribbean and Pacific possessions)
United Republic of Tanzania
Uruguay
USA
Vanuatu
Venezuela
Vietnam
Western Samoa
Yemen

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Identification Sheet for Whale Shark, *Rhincodon typus* (Smith 1828)

1.1 Class: Chondrichthyes (subclass Elasmobranchii)

1.2 Order: Orectolobiformes

1.3 Family: Rhincodontidae

The family contains a single, huge species (attaining 12 m) that has an enormous, traverse mouth situated well in front of the eyes (near the snout tip), minute teeth, large gill slits with internal filter screens, longitudinal body ridges, caudal keels, large first and small second dorsal fins, a semi-lunate caudal fin (except in small juveniles) without a subterminal notch, and a checkerboard colour pattern of light spots and stripes on a dark background.

These sharks, which are very large but harmless to humans, have also been erroneously referred to as rhiniodontids. They are planktonic feeders, occurring worldwide in tropical and warm temperate seas, near the coast and in the open ocean.

1.4 Species: *Rhincodon typus* (Smith 1828)

1.5 Field characters: A huge filter-feeding shark with a broad, flattened head, a very large, nearly terminal mouth, a semi-lunate tail, a checkerboard pattern of light spots and stripes on a dark background, minute teeth, filter screens on its gill slits, and prominent ridges on its flanks.

1.6 Distinctive features: Body fusiform, moderately stout with prominent longitudinal ridges on its upper flanks. Head depressed, broad and flattened. Mouth traverse, nearly terminal; nostrils with a rudimentary barbell. Gill slits very large, modified internally into filtering screens. Teeth minute, about 300 rows in each jaw, each comprising a single, hooked cusp. Caudal peduncle with lateral keels and a distinct upper precaudal pit. First dorsal fin much larger than second dorsal fin; set posteriorly on body, its insertion over the pelvic-fin bases. Anal-fin origin under front of second dorsal-fin base; these fins about equal in size. Pectoral fins falcate; caudal fin semi-lunate (except in small juveniles where upper lobe is considerably longer than lower lobe) with an indistinct terminal lobe. Total vertebrae [at least 153]*; precaudal [81]*.

1.7 Colour: Greyish, bluish or brownish above, white ventrally; upper surface pattern of creamy white spots between pale, vertical and horizontal stripes resembles a checkerboard.

1.8 Size: Free-swimming at 40-50 cm and attaining 1200 cm or more.

1.9 Remarks: The whale shark is the largest living fish. It feeds on a wide variety of planktonic and nektonic prey, including small crustaceans, small schooling fishes, and occasionally on tuna and squid. It does not rely on forward

motion for filtration, but can hang vertically in the water and suction feed by opening its mouth and allowing water to rush in. Sea temperatures in the 21-25C range, in the vicinity of cold water upwellings, are preferred because this conditions are probably optimal for its prey. Adults occur either singly or ion aggregations of upto hundreds of individuals. They are highly migratory. Their movements are thought to be related to local productivity and are often associated with schools of pelagic fish. Harmless to humans.

2.0 Similarity with other species: The whale shark has a very distinctive spotted appearance, and is unlikely to be confused with any other species. The fins of the adults are extremely large, have concave trailing edges and are rounded at the tips. For this reason alone, they are very unlikely to be confused with those of any other species when detached from the body. The meat is also distinctive, as it has a unique soft spongy texture and the myomeres (muscle fibres) are of exceedingly large size.

A CITES identification manual has been developed in Australia to assist in the identification of whale shark fins in international trade.

2.1 Scientific synonyms: Primarily variant spellings: *Rhiniodon typus, Rhineodon typus* Smith, 1828; Genus *Rhinchodon* Smith; Genus *Rineodon* Müller and Henle, 1838; Genus *Rhineodon* Müller and Henle, 1838; Genus *Rhinodon* and *Rhineodon typicus* Müller and Henle, 1839; Genus *Rhiniodon* Swainson, 1839; Genus *Rhinecodon* Agassiz, 1845; Genus *Rhinodon* Smith, 1849.

Other synonyms: *Micristodus punctatus* Gill, 1865. *Rhinodon pentalineatus* Kishinouye, 1901.

2.2 Common names: English: Whale shark. Spanish: Tiburon ballena, pez dama (chequer-baord fish). French: Requin-baleine. Philippines (several dialects): Butanding, balilan, tuki-tuki, tawiki, totoki, iho-tiki. Japanese: Ebisuzame, Ching sha k'o, Jimbeizame-ka. Chinese: [tofu shark]. Russia: Kitovye akuly

2.3 References: Last and Stevens (1994); Stead (1963); Grant (1978); Wolfson (1986).