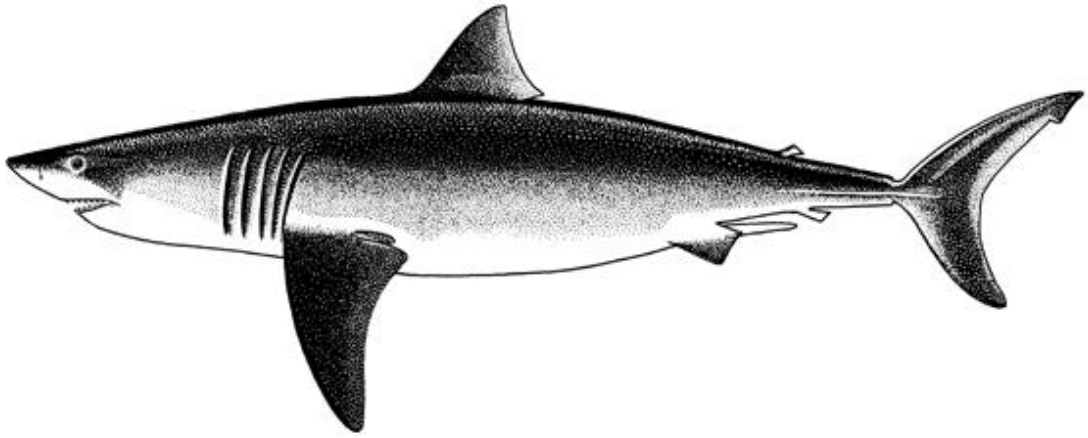


Proposal to include *Carcharodon carcharias* (Great White Shark) on Appendix I of the Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES)

Summary

Evidence from beach netting, game fishing and commercial captures all reporting declining captures of the Great white shark indicates that the population of the species is in decline. Evidence suggests that the population may have declined by at least 20% over the last three generations. In some areas the species is considered to have declined by substantially more than this over that period. The population, though widespread, is considered to be small in comparison to other shark species, and, particularly when compared to most other marine fish species, the species has a very low reproductive rate. The decline, in its major range areas, is considered to be ongoing. The species hence meets criteria A(i) and C(ii) of Annex 1 of Res.Conf. 9.24.

Trade in specimens of the species, though not well documented, is known to occur. Trade is particularly apparent in jaws and teeth of the species as these are easily identified. Trade is also known to occur in fins and other body parts though the quantities are not well known. Trade is continuing from areas where the species is fully protected, which include the major range States for the species. The assistance of CITES in minimising or eliminating this trade would assist in arresting the decline of the species.

A. Proposal

To include *Carcharodon carcharias* (Great white shark) on Appendix I in accordance with Article II(1) of the Convention on International Trade in Endangered Species of Wild Fauna and Flora. This proposal addresses the relevant biological criteria outlined in Annex 1 to Resolution Conf. 9.24, and emphasises the precautionary measures specified in Annex 4 of the Resolution.

B. Proponent

Australia, United States of America

C. Supporting Statement

1. Taxonomy

1.1 Class Elasmobranchii
1.2 Order Lamniformes
1.3 Family Lamnidae
1.4 Species Carcharodon carcharias
1.5 Scientific Synonyms See Appendix A.
1.6 Common Names See Appendix B.

2. Biological Parameters

2.1 Distribution

The Great white shark is widely distributed, and located throughout temperate and sub-tropical regions in the northern and southern hemispheres. It is primarily found in the coastal and offshore areas of the continental and insular shelves and offshore continental islands.

The Great white shark is most abundant near the pinniped colonies along the Central Californian Coast, the shelf waters of the mid-Atlantic Bight, the Great Australian Bight and the Cape and KwaZulu-Natal provinces of South Africa (Fergusson 1996) (see Figure 1). For a more in-depth list of range states, see Appendix C.

Smaller specimens (below 3 metres) are mostly restricted to temperate waters, with newborn and 0+ young (less than 176 centimetres in length, Cailliet *et al.* 1983 *in* Francis 1996) specimens reported from New Zealand, Australia, South Africa, the eastern North Pacific, the western North Atlantic, and the Mediterranean (Francis 1996).

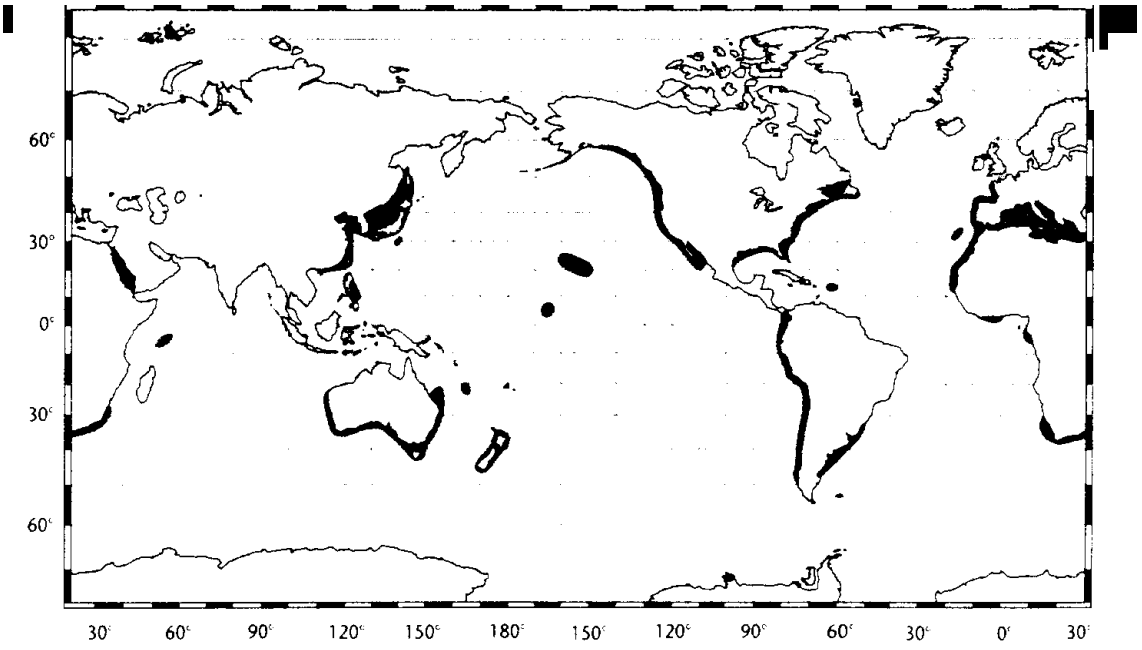
There have been reports of embryos and pregnant or postpartum Great white sharks from New Zealand, Australia, Taiwan, Japan and the Mediterranean Sea (Francis 1996). This indicates that parturition probably occurs in a wide range of mostly temperate locations worldwide. The Mediterranean Sea, especially the coastal areas, is noted as being a pupping and nursery ground for the Great white shark. Although *Carcharodon* is essentially rare wherever it occurs, the Mediterranean Sea, from a comparative viewpoint, should be classified as one of the global centres of reproduction and abundance for the species (Fergusson 1996: 338).

The Great white shark is capable of swimming long distances, over long periods. For example, offshore tracking of a large shark with sonic tags indicated that it moved 190 kilometres in 2.5 days at an average cruising speed of 3.2 kilometres per hour (Carey *et al.* 1982 *in* Bruce 1992).

While Great white sharks are considered to be a migratory species within their range area, it is possible that they may also move in and out of areas at the limits of their range on a seasonal basis (Fergusson 1996). There is evidence that some larger non-breeding individuals have a wider temperature range and penetrate tropical waters where carcharinid sharks are located, and may also enter the waters surrounding oceanic islands. Captures of adult specimens at the Azores Islands indicate that some degree of transoceanic migrations over considerable distance may occur (Compagno 1984a *In* Fergusson 1996). In the case of the Azores this may be as a (largely) west-to-east nomadic journey within the Gulf Stream from North America (Fergusson 1996: 337). Rare mid-ocean records are also known from the Pacific, at the Hawaiian, Marshall, and Easter islands (Fergusson 1996), and there

have been reports of sightings of the shark in the tropical south-west Indian Ocean, including Madagascar, Mauritius and Kenya (where a pregnant female was taken in 1996 in an artisanal fishery) (Natal Sharks Board). All individual sharks in these cases appear to be large (greater than 4 metres). This suggests that equatorial waters may be a deterrent to large-scale movement but not a complete barrier. Consequently, populations may not be genetically isolated (Fergusson 1996).

Figure 1: Dominant distribution of Carcharodon carcharias (Great white shark).



Source: Last and Stevens 1994

Studies of Great white sharks sighted at pinniped colonies indicate that the sharks appear to be largely transient, with a few longer term residents (Klimley and Anderson 1996, Strong *et al.* 1992). A number of studies indicate that some populations appear often to be small and highly localised, with a high degree of site attachment. For example, in one study in the Spencer Gulf area (South Australia), 36% of sharks were resighted always in their original location (Strong *et al.* 1992). A further study in South Africa found that of 147 Great white sharks tagged, 30 individuals were resighted 59 times (20.41%), one of which was resighted 10 times. Of the 147, all but two were resighted at the same area in which they were originally observed (Ferreira and Ferreira 1996). The resighting of individual Great white sharks at particular localities is well documented in other areas of the world (Bruce 1995), such as Western Cape (South Africa) (Cliff *et al* 1996) and California (Klimley and Anderson 1996).

A number of studies have also indicated that there is a degree of spatial segregation of Great white sharks by sex (Strong *et al.* 1992; Bruce 1992; Cliff *et al* 1989 *in* Bruce 1992), with females frequenting areas that are generally more accessible to fishermen (Murphy 1996). One study off the coast of South Australia recorded a predominance of females off inshore islands, and a predominance of males adjacent to offshore islands (Strong *et al.* 1992). This segregation can fluctuate with location and over time (Strong *et al.* 1996).

2.2 Habitat Availability

Within its range states, the Great white shark is often found close in shore to the surfline and even penetrates shallow bays in continental coastal waters. In waters along the continental shelf, Great white sharks generally locate near the surface, or at the bottom from 16 to 32 metres depth (Goldman *et al.* 1996). Average depth is 20 metres (Strong *et al.* 1992).

While Great white sharks are widely distributed, they seem more common in some locations (see above), with particular areas seen as important pupping grounds. Coastal areas are a preferred habitat, and their population level could be affected by coastal habitat degradation. The risk of this occurring is heightened by the fact that much of the species habitat is in areas with dense human populations. Beach meshing, often employed in areas of the Great white shark's preferred habitats, also threatens to reduce

population numbers. Great white sharks caught by beach meshing programs are usually small (less than 3 metres), and in many cases, particularly off eastern Australia, are smaller than 2 metres. This suggests that these programs operate close to pupping grounds or in juvenile nursery habitats. However, while beach meshing undoubtedly is detrimental to smaller specimens, the widespread occurrence of similar small sized Great white sharks in areas where beach meshing is not undertaken suggests that nursery habitats are also probably widespread (B.Bruce, CSIRO, pers. comm.).

2.3 Population Status

Available data on absolute or total population numbers for the Great white shark is extremely limited. As large commercial fishing fleets do not target Great white sharks, information on the volume of catches and landings is poor. As such, its population status is uncertain. What is apparent from work done on sharks, however, is that it is uncommon to rare compared to most sharks. It appears to be relatively scarce compared to most other widely distributed species, and its population is considered to be declining. This is reflected in the fact that the Great white shark is listed as 'vulnerable' on the 1996 IUCN World Conservation Union Red List of Threatened Species. This listing recognises that a decline of at least 20 per cent has been observed, inferred or suspected over the last 10 years, or over three generations.

Pregnant females are rarely reported. Little is known, therefore, about the reproductive rate and behaviour of the species. Compagno *et al.* (1997) reported that the species may have an unusually low fecundity rate for elasmobranchs, and a long gestation period, with relatively few adult females being pregnant at any one time. Great white shark females do not reproduce before reaching 4.5 – 5.0 metres in length, and have a relatively small litter of around two to ten pups (sometimes as high as 14) (Francis 1996). It is thought that they do not reproduce every year, and that their gestation time is longer than 12 months (Camhi *et al.* 1998). This is typical of many K-strategists, making them vulnerable to exploitation. ('K-strategist' species are defined has having slow development, relatively large size, and producing only a small number of offspring at a time.)

Tagging studies of Great white sharks off the South African coast (for the region Richards Bay in KwaZulu-Natal to Struis Bay in Western Cape) between 1989 and 1993 provide average estimates of 1279 sharks in the region (Cliff et al. 1996), while Strong *et al.* (1996) have estimated that there could be approximately 200 at Dangerous Reef in South Australia (in an area of approximately 260 km^2). The Endangered Species Scientific Subcommittee (ESSS) in Australia, estimated that the Australian population numbered fewer than 10,000 mature individuals, and that it has undergone a continuing decline of at least 10% over the past three generations (about 30 years). ESSS also estimated that around 500 Great white shark mortalities may occur due to human activities in Australian waters each year. The assessment of the Great white shark's population status is supported in that New South Wales, Victoria and Tasmania have listed Great white shark as 'vulnerable' on their threatened species legislation.

2.4 Population and Geographic Trends

Although there are no quantitative estimates of Great white shark global population size, there are a number of trend analyses, local population estimates, and anecdotal information sets that indicate stock declines in recent years. Reliable data comes from a number of sources including beach meshing programs, gamefish captures and catch per unit effort information from commercial captures. A number of studies, and anecdotal evidence in North America, South Africa and Australia, all indicate that numbers may be declining. As the studies available have been in Southern Australia, U.S.A. and South Africa – the major range areas of the Great white shark – they are likely to be indicative of similar trends elsewhere. There is a however a relative scarcity of long term monitoring and studies of populations outside of these areas, and inconsistent methodologies make it difficult to compare data.

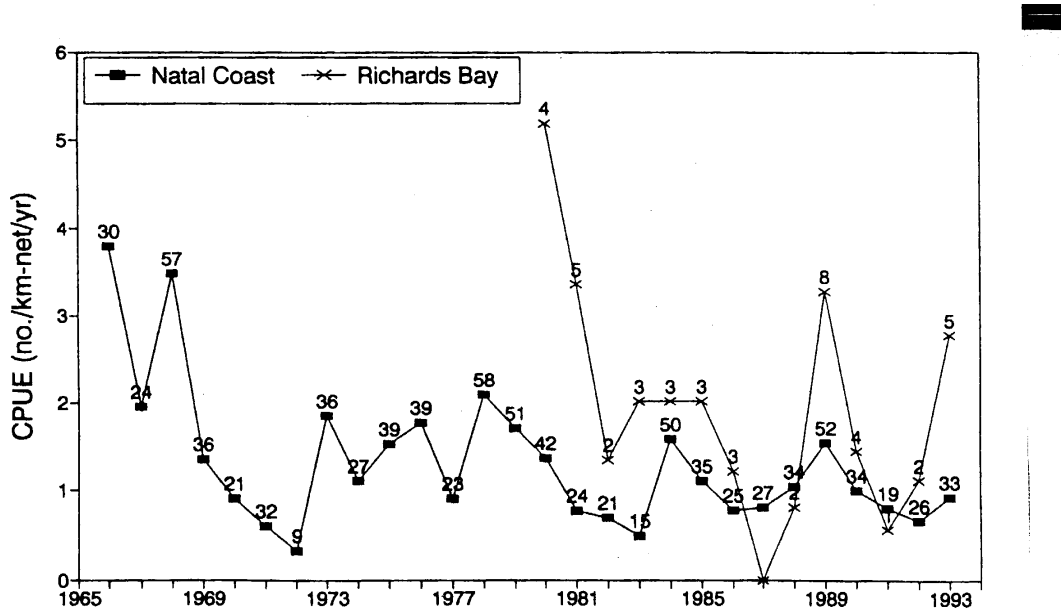
Sport-fishing data from the east coast of North America and south-eastern Australia indicate declines in the proportions of Great white sharks taken relative to other shark species caught over the last several decades (Bruce 1992; Casey and Pratt 1985). For example, a study by Pepperell (1992) recorded a decline in the number of Great white sharks relative to other sharks caught by game fishermen off the coast of south-eastern Australia of 1:22 in the 1960s, to 1:38 in the 1970s to 1:651 in the 1980s (other sharks largely consisted of shortfin, mako, blue, tiger and, until 1979, white nurse). This decline in

numbers is also reflected in sportfisheries data from the eastern United States, where the proportion of Great white sharks taken relative to other shark species dropped from 1:67 in 1965 to 1:210 in 1983 for the mid-Atlantic Bight (Casey and Pratt 1985).

Anecdotal evidence from South Australian fishers and divers also shows a decline in number of Great white sharks in recent years (Bruce 1992; Strong *et al.* 1992). These claims are supported by a reported decrease in the capture of Great white sharks from game fishing activities in South Australia from around 25 Great white sharks per year in the 1950s, to an average of 1.4 sharks per year in the 10 years to 1990 (Presser and Allen 1995). It is possible that the relative decline in Great white shark captures may be due to other factors such as: shifts in angling further from Great white shark habitat (Pepperell, 1992), changes in fishing equipment or techniques, changes in the abundance of the other sharks, or an increased concern for Great white shark conservation. Alternatively, the recent increase in coastal human populations may have resulted in increased fishing pressure on Great white shark and subsequent population declines.

Declining catch rates in shark nets in Natal have also been reported. A longitudinal study off the KwaZulu-Natal coast between 1966 and 1993 (see figure 2) saw a decline in Great white shark numbers, with the authors calculating the decline in the latter part of the study (between 1973 and 1993) as significant (Cliff *et al.* 1996). Catches of the species from New South Wales protective beach nets also exhibited a steady decline since the commencement of meshing (Reid and Krogh 1992).

Figure 2: The annual catch of Great white sharks per unit of effort (CPUE) in all shark nets, except those at Durban, Anstey's, and Brighton beaches and Richards Bay, 1966-1993 (Natal Coast) and for Richards Bay, 1980-1993. Annual catches are given next to each datum point.



Source: Cliff G., Dudley, S.F.J. and Jury, M.R. (1996)

Studies indicate that there are possibly natural fluctuations in Great white shark abundance in some areas, thought to be related to temperature and (to some extent) life stage. For example, Cliff *et al.* (1996) noted a cyclical trend of Great white shark abundance from shark nets along the KwaZulu-Natal coast, peaking at 4 to 6 year intervals (see figure 2). The authors however, do not consider natural fluctuations responsible for the decline over recent decades (Cliff *et al.* 1996).

2.5 Role of Species in its Ecosystem

The Great white shark is an apex predator, and therefore, it is presumed to play an important role in the marine ecosystem by, among other things, keeping the population of their prey in check, and aiding the maintenance of genetic fitness of its prey. The diet of Great white sharks smaller than about 3 metres

consists mainly of a variety of teleost and elasmobranch fishes, while marine mammals are a major part of the diet for larger sharks (Last and Stevens 1994; Cliff *et al.* 1996).

It is difficult to predict accurately what impact a continued decline of the Great white shark may have on the ecosystem, "in the absence of more precise information, however, the roles of these fishes should not be underestimated. Indiscriminate removal of apex predators from marine habitats could disastrously upset the balance within the sea's ecosystems" (Last and Stevens 1994: **7**).

2.6 Threats

The major impacts on Great white shark populations are largely a result of human actions including

- direct and incidental fishing pressure,
- decline in the abundance of its prey,
- protective beach meshing,
- intensified targeted commercial and sports fisheries for trophies,
- degradation of the sharks habitat, and
- incidental catch of the species in commercial and artisanal fisheries.

Increasing human population in coastal areas may lead to degradation of important inshore feeding and reproduction habitat for Great white sharks. The proximity of Great white shark habitat to human populations further increases the chances of sharks being killed in targeted fisheries or as a by-catch.

The species is known to investigate actively human behaviour. They are bold and inquisitive in their approach to vessels and fishing gear. This innate behaviour increases the likelihood of being killed by humans, intentionally or not.

The negative image of the Great white shark, and the fear it inspires in humans, often precipitates unwarranted killing of the species. The impact of these actions is made worse by the proximity of Great white shark staging and breeding areas to coastal human populations. Examples include: campaigns to kill Great white shark after shark attacks, disregard of conservation and management measures, and eradication measures such as beach-meshing. Compagno 1996 (in Marshall and Barnett 1997) documented Great white shark mortality of 80% from entanglement and drowning in beach-meshing operations in Natal, South Africa.

As mentioned above, Great white sharks mature late, have few young with few adult females pregnant at one time, and have long gestation periods (Camhi *et al.* 1998**).** These characteristics make them vulnerable to over-exploitation and minimise the amount of sustainable yield that can be obtained from the stocks.

Because Great white sharks, though generally rare, appear to form local populations, the species is highly vulnerable to over-exploitation if there is strong fishing pressure within that area. Evidence suggests they can easily be exploited to the point of extinction, even where relatively few are regularly removed from an environment. For example, research off the Farallon Islands suggested that the removal of just four Great white sharks greatly reduced, and possibly eliminated the entire local population of Great white sharks (Ainley *et al. In* Cailliet *et al.* 1985).

Direct pressure on Great white shark populations comes from their being targeted for their teeth, jaws and fins, or when they become a nuisance to fishing operations (Bruce 1992). Great white shark teeth and jaws have significant economic value (Compagno *et al.* 1997). A jaw of a Great white shark from Gans Bay, recently recovered after being stolen, was valued at US$50,000. Small jaws may be sold for as much as US$15,000, and individual teeth from small sharks for US$600 (IUCN Shark Specialist Group 1998).

There is also reportedly a commercial market for neonates (Camhi *et al.*). The South African Museum recently obtained the headless carcass of a juvenille Great white shark (estimated at about 1.6 metres long), allegedly killed by a commercial fisherman (IUCN Shark Specialist Group 1998).

Basic economics would indicate that as Great white shark populations continue to decline, the economic value of these curios will increase, possibly leading to increased targeting, and over-exploitation, as well

as growth of an underground sales network or black market for highly lucrative Great white shark products (Compagno *et al.* 1997).

Fishers generally target the larger sharks for their teeth and jaws, which could have a significant impact on population numbers in the long term. The Great white female reaches sexual maturity only when she is approximately 4.5 to 5 metres long, compared to males that reach sexual maturity at 3.5 to 4 metres long, when about twelve or fourteen years old (Camhi *et al.* 1998). Hence it is the reproductively active females and larger males that are being targeted.

An increased trade in shark products in general promotes the catch of the Great white shark as incidental catch of other shark fisheries. The Great white shark is an incidental catch of fisheries that use longlines, hook-and-line, fixed bottom gillnets, fishtraps, herring weirs, and trammelnets, harpoons, and bottom and pelagic trawls, as well as purse seines (Food and Agriculture Organisation of the United Nations 1999). Strong *et al.* (1996) found through studies in South Australia, that 10% of Great white shark were observed bearing short remnants (less than 2 metres) of longlines and gill nets. Bruce (1992) found in the lower Spencer Gulf, South Australia, that 30% of Great white sharks sighted had evidence of a previous encounter with commercial fishing gear. These, of course**,** were the fish that had survived their encounter with fishing equipment.

A further direct threat to the Great white shark is from sports fishing. Big game sports fishers such as Alf Dean and Bob Dyer from the 1950s, and the film 'Jaws' in the 1970s, led to a dramatic increase in game fishing for this shark (Ellis and McCosker 1991). This direct targeting of Great white sharks, together with developments in fishing equipment and growth in human population and affluence, is likely to have increased its mortality rate in recent decades.

Inadequate population data means that it is almost impossible to know what percentage of the shark population is being killed, and what chances it has to recover from these losses. In light of this lack of data, it is imperative that precautionary measures be considered in assessing this proposal.

Finally, inadequate protective legislation on a global scale, lack of local enforcement where protective legislation is in place, and disregard of protective measures all form significant threats to shark population numbers (Compagno *et al.* 1997).

3. Utilisation and Trade

3.1 National Utilisation

Some of the uses for sharks species in general include meat, skins, organs, and tissues for human consumption, liver oil extracted for vitamins, carcass used for fishmeal and fertiliser, skin for leather, cartilage for medicines, fins for shark-fin soup and even meat or small specimens for fish bait. Information regarding the utilisation of Great white sharks in particular is often limited, as national fisheries statistics usually do not include this species, or as it is hard to differentiate from other shark by-products (Rose 1996). However, Great white shark is known to be used for leather (but is not necessarily a preferred species) and its liver oil has generalised uses (Rose 1996).

Liberia reports that the Great white shark is often consumed in that country as a daily source of protein, especially in the coastal cities and towns, and notes unconfirmed reports that the tissue is used as surgical stitches (Forestry Development Authority, Republic of Liberia).

As noted above, the most prized products of the Great white shark are its teeth and jaws, particularly for sale to tourists and tourist shops, and the status that comes from its capture. Jaws from a Great white shark caught in New Zealand were recently purchased by a UK collector, who also had offers for jaws from animals caught off Chile and Mexico (Fergusson *et al.* 1996).

3.2 Legal International Trade

It is difficult to ascertain the current level of trade occurring in Great white shark products. In many cases, shark products are not identified down to species level.

There is also a significant amount of misreporting of trade. For example, in 1993, South Africa recorded no export of shark fins to Taiwan, whereas Taiwan records show 3.28 tonnes of shark fin

imported from South Africa. Even this figure is likely to be an under-estimate, as the shark fin market is very competitive, with criminal gangs involved, and a proportion of fins are traded despite being illegal exports (Smale 1996).

The increasing demand for shark fins is reflected in FAO records, where international shark fin imports were recorded at 31 tonnes in 1980, and 335 tonnes in 1990, with the average value also increasing (Stoessell 1993). Hong Kong food traders prefer Great white shark fins to those of other species (Lai Ka-Keong 1983), while in Taiwan they are considered of medium grade (Chen 1996). Grading of shark fins depends on their size, thickness and their fin-needle content (Lai Ka-Keong 1983). The quality and quantity of fin needles differ between species, and so do their prices and grades. Higher grades demand higher prices and create a greater incentive to supply. As Hong Kong is an important importer, exporter, re-exporter and processor of shark fins, the way they grade Great white shark fins is significant. The fins are also known to be in trade in Singapore (Rose 1996), and Liberia. Liberia has unconfirmed reports that a low scale international trade exists unofficially between Liberia and either Republic of Senegal or Mali, with one dry fin of the Great white shark selling for US$25.00 (Forestry Development Authority, Republic of Liberia). Generally, however, Great white shark fins in trade are not identified, especially in customs coding, and often imports and exports of shark fins are not recorded at all (Rose 1996).

In South Korea, Great white shark meat is reportedly the most valuable meat from shark species, with wholesale prices of US$7.60 per kilogram for class A meat and US$3.20 for class B (Parry-Jones 1996).

3.3 Illegal Trade

It is thought that an underground trade in jaws may exist (Compagno 1996 *in* Marshall and Barnett 1997), with parts being sourced from nations where they are protected. For example, “It is believed that curio or marine specialty shops throughout the EU sell or import shark products such as teeth and preserved jaws. An avid collector of preserved shark jaws, vertebrae and other body parts has imported these into the UK from North and South America” (Fergusson 1996 *in* Fleming and Papageorgiou 1997).

There is also reports from cage-dive operators in South Africa that some local fishermen are killing Great white sharks at sea despite the shark’s protected status, removing their jaws and fins, and selling them to East Asian longliners (IUCN Shark Specialist Group 1998).

Most range states regulate neither catches nor trade in Great white shark products. Great white sharks are however still caught and traded in States with legislative protection for the species. The States include the major range States for the species. CITES listing will assist in the conservation of the species through minimising or eliminating trade in these circumstances.

3.4 Actual or Potential Trade Impacts

With a growing trade in shark fins, and a high value of shark curios, especially for the larger specimens, Great white sharks are under increasing threat. There is obviously a demand for Great white shark products, and CITES Appendix I listing for this species would ensure that this existing (and possibly growing) demand is not met.

3.5 Captive Breeding or Artificial Propagation for Commercial Purposes

It has thus far proved impossible to keep Great white sharks in captivity for any significant period of time. This is due to many constraints including the difficulties associated with capture, transport (it must keep moving in order to breathe), its size and rarity, sensitivity to slight electrical impulses and its temperament in captivity. The longest a Great white shark has been held in captivity was three days (Ellis and McCosker 1991). Captive breeding is thus not a viable option in the near future.

4. Conservation and Management

4.1 Legal Status

4.1.1 National

South Africa established the precedent for domestic protection of Great white shark, when it prohibited the intentional killing or sale of the species on 11 April 1991 (Rose 1996). Namibia followed South Africa, by becoming the second nation to protect the Great white shark in 1993. The species also received protection in California in 1994 (Rose 1996), and later in Florida. It is also protected in the Maldive Islands (Rose 1996).

In Australia, the Great white shark was listed as vulnerable under the *Endangered Species Protection Act 1992* in 1997, and is therefore protected in Commonwealth waters. It is also protected under fisheries legislation in the waters of all States and Territories of Australia. Great white shark has been listed as 'vulnerable' on the threatened species legislation of New South Wales, Victoria and Tasmania.

In the United States, the species received protection in California in 1994 (Rose 1996), and later in Florida. The Magnuson-Stevens Fishery Conservation and Management Act is the primary domestic legislation governing management of U.S marine fisheries. Until recently, Atlantic sharks (including Great white sharks) were managed under a 1993 fishery management plan (FMP) which permitted limited harvest of Great white sharks. Acting under the authority of the Magnuson-Stevens Act, the U.S Secretary of Commerce, through the U.S National Marine Fisheries Service, replaced the 1993 shark FMP with a new policy that covered Atlantic tunas, swordfish, and sharks in April 1999. This new FMP prohibits the landing and sale of Great white shark throughout its range in U.S waters of the Atlantic ocean and adjacent seas (U.S Fish and Wildlife Service 1999).

New Zealand has a ban on commercial targeting of Great white shark, though the sharks may be sold if taken as by-catch (National Institute of Water and Atmospheric Research Ltd, New Zealand).

4.1.2 International

In 1996 the World Conservation Union (IUCN) listed the Great white shark as vulnerable on its Red List of Threatened Species.

A 1996 agreement between Australia and Japan (*Subsidiary Agreement between the Government of Australia and the Government of Japan concerning Japanese Tuna Longline Fishing 1996*) specifies that all sharks caught by Japanese tuna longliners within the Australian EEZ be either released alive and undamaged, or retained whole (Rose 1996). It also specified that details be recorded on individual shark species both retained and discarded.

4.2 Species Management

4.2.1 Population Monitoring

South Africa has informed Environment Australia that there are a number of research projects currently underway in parts of Africa that aim to help our understanding of the rate of mortality and population size of the Great white shark. However, a lack of uniformity between the projects, and possible antagonisms between research groups means that the projects are restricted to smaller sample groups from which it is difficult to draw conclusions (Natal Sharks Board).

The Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO) is currently studying the migration, biology, and abundance of the Great white shark. While the majority of this work is occurring in South Australia, studies are extending to other Australian waters.

4.2.2 Management Measures

In Australia, Environment Australia is drafting a recovery plan for the species (under the *Endangered Species Protection Act 1992*), and the CSIRO project mentioned above may also establish a basis for Great white shark conservation and management.

The April 1999 U.S shark/tunas/swordfish FMP (mentioned previously) contains several habitat conservation initiatives for coastal and offshore habitats utilised by Great white sharks. These include ways to mitigate the impact of fishing gear, marine sand/minerals mining, offshore oil and gas operations, coastal development, dredging and disposal of dredge material, agriculture, aquaculture, navigation, marinas and recreational boating, and ocean dumping. This FMP bans the landing and sale of Great white shark in the U.S species range, mandates detailed logbook reports from commercial shark fishermen, and limits Great white shark sportfishing to catch and release (U.S Fish and Wildlife Service 1999).

The FAO has prepared an International Plan of Action for the Conservation and Management of Sharks (IPOA-SHARKS). If adopted at the next FAO Conference (in November 1999), the plan will require states concerned with the management and conservation status of shark species, actively to identify and report on species-specific biological and trade data on sharks caught in their waters and by their vessels in foreign waters. It also encourages states to adopt a national plan of action for conservation and management of shark stocks *(Shark-plan)* if sharks are regularly caught in their waters, or by their vessels. The objective of the IPOA-SHARKS is to ensure the conservation and management of sharks and their long-term sustainable use (FAO Fisheries Department 1999).

4.3 Control Measures

4.3.1 International Trade

None

4.3.2 Domestic Measures

While there are protective measures in place in Australia, South Africa, Florida, California, the Maldives and Namibia, the control measures in place have, in some cases, limited impact, evidenced by the fact that shark teeth and jaws are still freely available from California and South Africa, despite the current trade bans (Fergusson *et al.* 1996).

5 Information on similar species

The Great white shark is the third largest shark, after the Whale shark and Basking shark. The United Kingdom has drafted a proposal to list Basking shark on Appendix II, and the United States of America a proposal to list Whale shark on Appendix II. Hence the three largest species would all be listed on CITES if the three proposals are all accepted.

The jaws and teeth of the larger individuals of Great white shark are distinctive and easily identified by a non-expert. A non-expert can identify the jaws of smaller Great white sharks, though there is the potential for some confusion with other coastal shark species, especially tiger sharks.

The fins of the species are most easily confused with the fins of the Whale shark and Basking shark. A large fin is almost certainly from one of the three species. The fins of smaller individuals of the species may potentially be confused other coastal shark species.

To distinguish between the three species and other species of shark the proponent parties are preparing identification sheets.

6 Other Comments

Several nations are currently endeavouring to protect the Great white shark within their own waters. Legislation was seen by these nations as pre-emptive to protect an “unabundant, poorly known apical predator that has great notoriety, a high commercial value and is the subject of much negative human interest” (Bruce 1995: 14). However, as the Great white shark is widely distributed, and possibly has some degree of transoceanic movement, domestic measures may only have limited effect, while unregulated international trade undermines individual attempts at protection of this species. International cooperation would greatly enhance the success of the domestic measures in certain countries, and encourage other nations to adopt their own. An Appendix I listing would help ensure that all CITES parties are brought to the same international standard.

The characteristics of this species meet the Biological Criteria necessary for inclusion in Appendix I, as the wild population is assumed to be small, and there has been both an inferred and observed decline in numbers, which is unlikely to reverse in the near future. If shark fisheries continue to develop, Great white shark harvest levels will almost certainly rise and probably result in elevated exploitation rates for the species.

Where Great white sharks are to be found, they are only found in relatively small numbers. Moreover, from what is known of the species' biology, and of the biology of apex predators and larger sharks in general (other than filter feeders), the Great white shark is highly vulnerable to exploitation.

Sharks are seen by a number of countries as an under-utilised resource, and there has in recent decades been an increased targeting of shark species. The current international management mechanisms to manage the fishery of this species, such as the FAO International Plan of Action for the Conservation and Management of Sharks are voluntary, and focus on the gathering of information. It does not, however, provide the Great white shark with the immediate protection it currently demands, and does nothing to inhibit the trade currently occurring in its products. CITES is the only mechanism which can ensure the latter occurs.

As it is unlikely that the current decline in Great white shark numbers will reverse in the near future, and as it is more probable that commercial kills will grow, listing the Great white shark on Appendix 1 is crucial to constrain the growth of trade in this species.

The draft of this proposal was sent out to forty five Range States, response was received from nineteen. The nations of United States of America, Republic of Seychelles, Croatia, France, Chile, Cameroon and South Africa indicated they are in full support of including Great white shark on Appendix I of CITES. The nations of Philippines and United Kingdom indicated support for the proposal in principle, while preferring that Great white shark be listed on Appendix II of CITES until further information is known on the species. Canada expressed that the biological criteria for listing on Appendix I was met but the trade criteria was not. Japan, Argentina, Spain and Mexico indicated that there is lack of information to support claims that the proposal meets criteria for Appendix I listing and therefore do not support the proposal. The Republic of China commented that since the FAO International Plan of Action for the Conservation and Management of Sharks exists there is no need to list Great white shark on the Appendices of CITES. New Zealand, Peru and Uruguay provided general information without indicating support or opposition, and Liberia provided positive comments about the proposal.

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Appendices

A. Scientific Synonyms

Carcharias lamia Rafinesque, 1810; *Carcharias verus* Cloquet, 1822; *Carcharias rondeletti* Bory de St. Vincent, 1829; *Squalus (Carcharias) vulgaris* Richardson, 1836; *Carcharodon smithii* Agassiz, 1838 or Bonaparte, 1839; *Carcharias atwoodi*, Storer, 1848; *Carcharodon capensis* Smith, 1849; *Carcharias vorax* Owen, 1853; *Carcharias maso* Norris, 1898 (not *Squalua (Carcharias) maou* Lesson, 1830); *Carcharodon albimors* Whitley, 1939 (Food and Agriculture Organisation of the United Nations 1999).

B. Common Names

Great white shark, White shark, White pointer, White death, Maneater, Maneating shark (English); Shovel Nose (Liberia); Grand requin blanc, Ami, Lamea, Lamie, Lameo, le Carcharodonte lamie, le Grand requin, Pei can (French); Jaquetón blanco, Ca mari, Marraco, Salproig, Salproix, Taburo, Tiburo (Spanish); Squalo bianco, Carcarodonte, Cagnia, Cagnesca grande, Cagnia, Caniscu, Carcarodonte lamia, Carcarodonte di rondelet, Imbestinu, Lamia, Masinu feru, Pesce cane, Pesca can, Pesce can grande, Pesciu can, Pisci cani grossu, Pisci mastinu (Italian); Weisshai, Menschen fresser, Menchenhai, Merviel fras (German); Hohojirozame, Hitokiuzame, Oshirosame (Japan); Lamia (German); Niuhi (Hawaiian Islands); Gab doll (Malta); Haa skieding (Norway); Tabarao (Portuguese); Gench, Kersch (Red Sea).

C. Range States

The range states for the great white shark are: Western Atlantic: Newfoundland (Canada) to Florida (U.S.A.), Bahamas, Cuba, northern Gulf of Mexico, Brazil and Argentina. Eastern Atlantic: France to Mediterranean, Madeira, Canary Islands, Senegal, Ghana, Congo, Western Cape Province, South Africa. Western Indian Ocean: South Africa, Seychelles Islands, Red Sea. Western Pacific: Siberia (Russia), Japan, the Koreas, China, Bonin Islands, the Philippines, Indonesia, Australia (Queensland, New South Wales, Victoria, Tasmania, South and Western Australia), New Zealand, New Caledonia. Central Pacific: Marshall Islands, Hawaiian Islands. Eastern Pacific: Gulf of Alaska to Gulf of California, Panama to Chile (Food and Agriculture Organisation of the United Nations 1999).