AMENDMENTS TO APPENDICES I AND II OF THE CONVENTION

Other Proposals

A. PROPOSAL

Inclusion of SCLERACTINIA spp., ATHECATA spp., COENOTHECALIA spp. and STOLONIFERA spp. in Appendix II.

B. PROPONENT

The State of Israel.

C. SUPPORTING STATEMENT

1. Taxonomy

11. Class:
a) Zoantharia
b) Hydrozoa
c) Alcyonaria

12. Order:
a) Scleractinia
b) Athecata
c) Coenothecalia
Stolonifera

Most corals in trade are reef-building and reef-associated species from tropical waters. Some 700 species in about 100 genera of hard reef-building and reef-associated corals have been described within the four orders above. The majority are, in the order Scleractinia, species of which are known as 'true' or 'stony' corals. Some species in this order occur in temperate and deep tropical waters and are not associated with coral reefs; these are not involved in commercial trade. The order Coenothecalia comprises a single hard coral, Heliopora coerulea, which occurs in trade. The orders Stolonifera and Athecata comprise a wide range of species, many of which are not involved in trade; they are listed in order to include the families Tubiporidae (Stolonifera) and Milleporidae and Stylasteridae (Athecata), many species of which are involved in trade.

A list of the orders, families and genera associated with coral reef in appended to this proposal. Further details on classification of the hard corals are available in Wood (1983) and Veron (1986). George and George (1979) provide a guide to family level of the classification of the orders concerned. Families, genera and species within these four orders which are not involved in trade are not discussed further here.

2. Biological Data

21. Distribution: The hard corals involved in trade occur on or in the vicinity of coral reefs between the latitude 30 N and 30 S. Coral reefs and coral communities occur in over 100 countries, in the Caribbean, western Atlantic, Red Sea, Gulf, Indian Ocean and Pacific Ocean (UNEP/IUCN, 1988/89). Many coral species have a cosmopolitan distribution across much of either the western Atlantic or the Indo-Pacific. A small number are

endemic to certain islands (e.g. Ctenella chagius from the Chagos Archipelago) or to restricted areas (e.g. Mussismilia from Brazil, and Erythrastrea from the Red Sea). For some species the full distribution is still poorly known. Distribution maps for the majority of genera are provided in Wood (1983) and more detailed information on the distribution of Indo-Pacific species is given in Veron (1986).

22. Population: Information on the global population sizes of particular genera or species is not available. Some species are clearly abundant in that they form the basic structure of coral reefs, such as Acropora palmata in the Caribbean. Others are much rarer, such as Dendrogyra cylindricus, also in the Caribbean, and Wellsophyllia radiata, known from only a few specimens in the Pacific (Wood, 1983).

Hard corals reproduce either asexually by the budding of the individual polyps or sexually by the production of eggs and sperm. In most species, the polyps are hermaphrodites, but some colonies have separate sexes. Eggs and sperm are usually released into the sea where fertilisation occurs, after which the young coral develops as a planula larva. This floats in the sea, drifting on ocean currents, before it settles on a suitable substrate and develops into a polyp and eventually a new coral colony. In some cases, fertilisation occurs within the coral and the young planula larvae are released directly. It is very likely that many of the mechanisms employed by corals for reproduction are still undiscovered. As recently as 1982 it was discovered that coral spawning in many instances, notably on the Great Barrier Reef, is highly synchronised. At least half of all the corals on the Great Barrier Reef spawn on one particular night of the year, the time related to the lunar cycle (Veron, 1986).

Growth rates are an important parameter of the population structure of corals. Most species grow very slowly, but there are distinct differences between species. Corals with porous skeletons increase in size more rapidly than those with solid ones (hence, for a given size, a solid skeleton may be older and heavier). In terms of overall dimensions, branched forms grow more quickly than massive, rounded ones.

Numerous studies have been carried out on coral growth rates and there is considerable variation in the actual rates obtained. Branching Acropora species appear to be among the fastest growing corals, with upward growth between 10 and 20 cm per year. In contrast, massive corals such as Montastraea and Platygyra grown only about 0.4 to 2.0 cm a year (Buddemeier and Kinzie, 1986). Work in the Philippines has shown linear growth rates of between 2.0 and 5.0 cm a year for some of the commonest corals, the faster growing genera being Pocillopora, followed by Stylophora, Seriatopora, Cyphastrea, Porites and Acropora (Gomez et al., 1982). According to Veron (1986), Porites colonies grow only about 0.9 cm a year, but reach eight metres in height and ages of over 1,000 year.

3. Trade Data

31. National Utilization: Reef corals are used locally as building materials, for road construction, for the production of lime, calcium carbide and cement, and for a variety of other industrial purposes in many countries such as the Philippines, Sri Lanka, Malaysia, India, Indonesia, Brazil and the Maldives (Wood and Wells, 1988).

In most countries where reefs occur and where tourism is important, such as the British Virgin Islands, Jamaica, Guam, Kenya, Seychelles, Sri Lanka, Australia, Thailand, and the Philippines, small coral colonies are collected for sale as souvenirs in coastal shops and stalls.

These local businesses have rarely been studied. An exception is in Australia, where coral exploitation on the Great Barrier Reef is well documented. It is carried out only under licence. In 1983, there were 12 licensed collectors, of which two accounted for over 60% of the harvest. Collecting is concentrated around Townsville and Cairns, from where 84% of the total annual harvest comes. About 45 tonnes are collected a year, of which over 90% is sold in Queensland, mainly as tourist curios. A small amount is sold live as aquarium specimens. Pocillopora damicornis accounts for over 70% of the total harvest; Fungia and Acropora are the next most popular varieties. Collection methods and financial and marketing aspects of this industry are described by Oliver and McGinnity (1985).

32. Legal International Trade: Hard corals are imported by many countries for sale as souvenirs, for decorating fish tanks, displaying jewellery and for a variety of other purposes. Customs statistics for corals alone are often not available as corals are frequently put in the same commodity category as ornamental shells. However, a few countries record them separately, including the USA which provides a detailed breakdown in the statistics of the US Customs Service and in those of the US Fish and Wildlife Service. The latter are probably incomplete for non-CITES species and are recorded partly as weight and partly as 'items'; this means that they are not directly comparable with the statistics of the US Customs Service which are recorded by weight only.

Official customs statistics for corals may include small quantities of precious and black corals (see Section 5). However, in most countries these corals are traded in comparatively small quantities and are heigh value commodities. As a result of the growing interest in the coral trade, FAO is now including corals in the FAO Fisheries Statistics Yearbook, but these figures are at present incomplete (Anon., 1988). Wood and Wells (1988) provide a more detailed discussion and analysis of the trade statistics available for corals up to 1987.

Importing Countries:The USA has been the main importer of ornamental hard corals for many years. These are sold throughout the country but the main concentration of retailers is in the Florida Keys. Annual imports of raw coral have increased dramatically since the 1960s (Fig. 1) when they averaged about 200 tonnes. Since 1983, there has been a rapid growth in imports

to a new record of 1,456 tonnes in 1988 (US Customs Service statistics). US annual reports to CITES indicate the following imports, recorded as 'items' rather then by weight*, for the 17 genera of corals currently listed in Appendix II:

1985	90,503
1986	956,284
1987	1,796,687

(* small quantities recorded by weight or as carving are not included in these totals)

Other major importers are Japan and several European countries. Japanese official customs statistics for coral probably include precious coral as it is a major importer of this commodity, but the Japanese report to CITES for 1986 shows that this country is also a significant importer of hard corals. A total of 114,652 pieces of hard coral were imported from the Philippines and Indonesia, and just over 5 tonnes from Taiwan (Japanese report to CITES, 1986).

European countries involved in the trade include Belgium, Denmark, France, Greece, Italy, the Netherlands, Portugal, Spain, UK and F.R. Germany. Spain and France recorded imports of raw coral as a separate commodity in their official customs statistics until 1978, when Spain imported nearly 300 tonnes and France imported over 100 tonnes (Wells, 1981). Since then, customs statistics have not been available for corals alone for European countries. Over 50% of marine curio retailers in the UK sold corals in 1986 (Wood and Wells, 1988). The Indonesia report to CITES for 1986 indicates exports from this country to Greece and Denmark.

Country reports to CITES indicate the following imports of Apendix II listed hard corals in 1986 and 1987 into Europe (excluding live corals; recorded as items):

Belgium	12,550 (Malaysia)	6,761 (Philippines)
France	13,750 (Philippines)	50,871 (Philippines)
Denmark	10,625 (Philippines)	not known
U.K.	4,720 (Philippines)	not known
Italy	none recorded	1,360 (Philippines)
Netherlands	none recorded	40,179 (Philippines)

Many tropical countries also import corals, despite having their own reefs. For exemple in Caribbean countries such as Mexico and Puerto Rico, Indo-Pacific species are the predominant corals on sale. This is partly because the Philippines and other South-East Asian hard corals are cheaper than supplies and partly because legislation prohibiting coral collection exists in a number of countries (Wells, 1981).

Exporting Countries: The Philippines is the main supplier of hard corals, accounting for about 50% of US imports in 1986, 1987 and 1988. This is discussed under illegal trade. Other major suppliers are Indonesia, Fiji, New Caledonia, Haiti (see illegal trade), Malaysia and Taiwan.

Small amounts of 'coral and similar substances' were exported sporadically from Indonesia in the 1970s and early 1980s. More recently, raw coral exports have increased noticeably, from 48 tonnes in 1983 to 425 tonnes in 1986 (official Indonesian Customs statistics). The 1986 Indonesian reports to CITES records total exports of 853,451 pieces of coral, of which 88% went to the USA, and the rest to Japan and Europe. US Customs Service statistics for imports of unworked coral confirm this; Indonesia is now the second main supplier to this country. US imports of coral from Indonesia have increased from 27 tonnes in 1983, to nearly 480 tonnes in 1988 (33% of total imports) (US Customs Service statistics).

Malaysia became an important supplier in the mid-1980s. In 1986 over 90 tonnes were imported into the USA from this country (US Customs Service statistics). The Belgian and UK reports to CITES recorded imports from Malaysia in 1986 (see above). No information has been found on current exports from Malaysia. Official Customs statistics for India suggest that coral exports are low (1 tonne in 1985 and none in 1986), but US Customs Service statistics recorded imports from India of over 40 tonnes in 1985 and over 60 tonnes in 1986. No imports have been recorded into the USA from India since then; exports of coral from this country are now illegal (see para. 41.).

Taiwan exports large quantities of raw coral, but is also an important supplier of precious corals, making the official customs statistics difficult to interpret. The US Customs Service statistics have recorded annual imports of between 6 and 63 tonnes of unworked corals from Taiwan since 1983. The US reports to CITES for 1985 give the following figures for CITES-listed hard corals imported from Taiwan:

1985	3,550 pieces plus 7,884 kg
1986	59,670 pieces plus 17,487 kg

New Caledonia and Fiji are the major exporters in the South Pacific. Production in New Caledonia rose from 75 tonnes in 1984 to 189 tonnes in 1985 (Anon., 1988). In 1986, 192 tonnes were collected of which 33 tonnes were exported (Joannot, 1985). Most New Caledonian exports are destinated for the USA, which imported 32 tonnes in 1987, although no imports from this contry were recorded in 1988 (US Customs Service statistics). Most of Fiji's exports are also destined for the USA; imports from this country rose from 54 tonnes in 1985 to 133 tonnes in 1988 (US Customs Service statistics). Efforts were being made to regulate this fishery in the mid-1980s, but the recent large increases in exports may be due to the changed political situation in this country. Samoa appeared in the coral trade statistics for the first time in 1988 when the USA imported nearly 39 tonnes (US Customs Service statistics).

Other countries recorded as coral exporters or re-exporters over the last decade include Thailand, Singapore, South Africa, the United Republic of Tanzania, Kenya, the Cayman Islands, Bahamas, the Dominican Republic and Kuwait (Wells, 1981; Wood and Wells, 1988). The USA is reported to have received consignments from Sri Lanka in 1989 (Gaski in litt., 27.4.89). Singapore is probably a significant re-exporter, but may also export directly;

in 1988 the USA imported 13 tonnes from this country (US Customs Service statistics). Other re-exporters include Belgium and Canada, both of which re-export small amounts of coral to the USA (reports to CITES). In 1988, the USA imported 30 and 69 tonnes respectively from France. The source of this coral is not known, but it could come from one of the French overseas territories or 'départements'. These quantities were not recorded in the US Fish and Wildlife statistics for these years. Similarly, the source of the 21 tonnes imported by the USA from Italy in 1988 (US Customs Service statistics) is not known.

Worked Coral: There is a small trade in worked hard coral. The majority of worked coral imports into the USA are precious and black corals, but some worked hard coral ('carvings') is imported from Indonesia, the Philippines and Taiwan (US reports to CITES). Worked hard coral in the form of ornaments and lampshade bases is exported from New Caledonia (Joannot, 1985). A small quantity (less than 150 kg) was exported annually from Australia in the aerly 1980s to Fiji, Vanuatu and Reunion (Oliver, 1984).

Live Coral: An increasing amount of live coral is now being traded in for use in the marine aquarium trade. US Fish and Wildlife Service import statistics [considered to be probably incomplete (Gaski in lit., 1989)] give the following total imports of live corals:

1984	871 pieces
1985	6,015 pieces
1986	40,558 pieces
1987	20,922 pieces
1988	39,246 pieces (Jan.-Oct. only)

Tne main suppliers are Indonesia, Haiti, Sri Lanka, the Philippines, Singapore and Taiwan. The UK imported a total of 5,400 pieces of live coral in 1986, all from Malaysia (UK 1986 report to CITES).

Total World Trade: Since the USA is currently importing nearly 1,500 tonnes of hard coral a year, and since Europe and Japan are also evidently significant importers, it would not be unreasonable to estimate total world trade in raw ornamental corals as at least 2,000 tonnes. A large proportion (c. 30% according to US imports) is based on illegal exports from the Philippines (see below).

Comparing US Customs Service statistics (in weight) with US Fish and Wildlife Service statistics (mainly in 'items') the average weight of a piece of coral in trade is a little under 1 kg. The average weight of a 20 ins diameter piece (assumed to be about the average size of pieces in trade), obtained by weighing a small quantity of dead corals, is 0.5 for massive corals and 0.25 kg for branching corals (Wood pers. comm., 1989). Total world trade can therefore be estimated at between 2 million pieces of coral (using weight of 1 kg) and 6 million pieces (on the basis of 1,000 tonnes of branching and 1,000 tonnes of massive coral).

33. Illegal Trade: Collection and export of stony corals has been prohibited in the Philippines since 1977, apart from a seven month period in 1986 when the ban was temporarily lifted.

Nevertheless, this country has remained the main supplier of ornamental hard corals. Most collection is carried out in the Cebu and Zamboanga areas (Ross, 1984; McManus, 1980; Wells, 1981).

As mentined above, the USA is the main importer of Philippine coral, although under the Lacey Act, the import of illegally collected coral is prohibited. Imports of unworked coral into the USA from the Philippines reached a peak of 683 tonnes in 1978. Imports then declined to 243 tonnes in 1983 before rising to 641 tonnes in 1987 and 601 tonnes in 1988 (US Customs Service statistics). According to US Fish and Wildlife statistics, the US imported the following hard corals from the Philippines.

1987	681,235 pieces + 134 tonnes
1988 (Jan.-Jul.)	120,422 pieces + 18 tonnes

Many European countries also import coral from the Philippines. Figures available for 1986 are difficult to interpret as imports during this year could have come in during the seven-month period that the Philippines ban on exports was lifted. However, in 1985, before the ban was lifted, 10,240 pieces of hard coral were imported from the Philippines by the UK (UK report to CITES 1985). In 1987, the UK imported 42 tonnes (93,270 pieces) from this country. No licences have been issued by the UK for imports from the Philippines since 1st October 1988 (Bottomley in litt., 27.1.89). 6,781 pieces of Appendix II listed coral were imported by Belgium from the Philippines in 1987 (de Meulenaer in litt., 6.1.88).

Efforts are now being made to improve enforcement of the Philippine ban on coral exports. The Philippine CITES Management Authority has stated that no permits have been legally issued by the Philippine Bureau of Fisheries and Aquatic Resources permit section since November 1986. Permits which have accompanied consignements since then must have been issued in contravention of regulations. In November 1988, Parties to CITES were requested to inform the Secretariat and Philippine Management Authority of any such parmits. There have been some confiscations. For exemple, in October 1988, 3.1 tonnes of Philippine Appendix II corals were confiscated at Antwerp in Belgium, en route for Liege from F.R. Germany (de Meulenaer in litt., 6.12. 1988). In March 1989, a consignment of six tonnes exported from the Philippines to Portugal was confiscated (Ramos in litt., 17.3.89). The US Fish and Wildlife Service has taken steps to improve enforcement of the Lacey Act with respect to corals (Gaski, 1988) and a notice has been published in the Federal Register to this effect (see para. 41.).

Haiti reportedly banned the export of hard corals in 1976 but it has not been possible to find out whether this legislation still exists and if it does, whether it is enforced. In the early 1980s, the USA imported less than 7 tonnes annually from Haiti, but in 1988, over 18 tonnes were imported from this country (US Customs Service statistics).

34. Potential Trade Threats: Being sessile, corals are very easily collected. This, combined with their slow growth rate (see para. 22.), makes them vulnerable to over-exploitation. A study of a Philippine reef subject to commercial collecting showed that six

of the more commonly collected species had undergone a decline in abundance by 73% (measured as colony density and percent reef coverage) (Ross, 1984). Comparison of this reef with an unexploited reef showed that there was a reduction in abundance and colony size range of the harvested species on the former. Small or immature coral colonies are preferred for the trade and collectors concentrate in certain areas. Long-term collection of immature colonies may have accounted for the near absence of Seriatopora and the reduction of Fungia in the collected area. In New Caledonia, it has been estimated that twelve times the calculated sustainable yield (15.5 tonnes a year) of faviid corals is being taken at Tetembia Reef, the only area where coral collection is currently permitted (Joannot and Bour, 1988).

Although collection may not threaten many coral species with extinction, intensive collecting in a small area or moderate collecting over a long period may degrade or partially destroyed a reef, as it results in the removal of the living animals responsible for the formation of the reef. This causes loss of habitat for fish and other reef animals, many of which are important for local or commecial fisheries. For example, Carpenter et al. (1981) found a positive correlation between fish standing biomass and percent coral cover in the Philippines. Intensive coral collecting can also lead to erosion of the coastline through removal of the natural breakwater created by the reef, and to deterioration of the aesthetic qualities of the reef which may affect the tourist industry.

There are numerous anecdotal reports of damage to reefs caused by coral collecting. Such damage or potential damage has been reported in 44 of the 109 countries with reefs (UNEP/IUCN, 1988/9). The threat is particularly serious on reefs which are already under stress from other factors such as siltation, pollution and intensive recreational and fishery use.

Concern about the impact of coral exploitation is evident from the number of countries that have introduced legislation to prohibit or regulate collecting (see para 41.). There have been a number of additional recommendations. Six species of stony coral (Acropora palmata, A. cervicornis, A. prolifera, Dendrogyra cylindricus, Mussa angulosa and Eusmilia fastigiata) have been identified as Endangered by the Florida Committee on Rare and Endangered Plants and Animals and a further nine species have been identified as Threatened (US, rather than IUCN, categories). Complete protection of these species was recommended (Franz, 1982). Dendrogyra cylindricus was recommended for listing on the U.S. Endangered Species Act but no action has yet been taken. In Guam, it has been recommended that Euphyllia spp., Plerogyra sinuosa and Tubastraea aurea should be protected (Hedlund, 1977).

4. Protection Status

41. National: In most countries, collection of corals and other marine organisms is prohibited within marine parks and protected areas. The following list provides examples of legislation specific to hard corals (UNEP/IUCN, 1988/9; Wood and Wells, 1988).

Australia: Coral collecting is regulated by both Commonwealth and State legislation, and on the Great Barrier Reef is restricted to licensed areas of the reef front. Additional permits are

required from the Marine Park Authority if licensed areas fall within zoned sections of the park. Commercial collecting is permitted only within zones designated for general use. Export and import of coral is controlled under the Wildlife Protection (Regulation of Exports and Imports) Act 1982. Regulations to this Act, which came into effect in 1984, permit the export of coral specimens only in accordance with an approved management programme (Oliver and McGinnity, 1985). As yet there are no approved management programmes and no permits have been issued for coral exports.

Bahamas: Collection of corals is prohibited under Fisheries Resources (Jurisdiction and Conservation) Regulations 1986.

Bermuda: Stony corals are protected within territorial waters.

Cayman Islands: Collection of corals is illegal.

Dominican Republic: The sale and collection of a number of stony coral genera is prohibited under a decree of 1986.

Egypt: Taking of corals is prohibited along part of the Sinai coast.

Fiji: Legislation has not yet been introduced but guidelines have been drawn up. SCUBA gear should not be used for collecting, and export permits are required; collectors have been advised to move operations to fringing reefs and inner lagoons, away from inshore reefs which are likely to be slower to regenerate because of turbidity and freshwater run-off.

Guam: Live coral may not be removed from depths of less than 10 fathoms and corals may be collected only with an appropriate permit.

Haiti: Coral collecting was reportedly banned in 1976 but there is no evidence that this was ever enforced, and it has not been possible to confirm the report of the ban.

India: Corals may not be collected in certain areas under local jurisdiction. The Exports (Control) Order 1988 bans export of all 'wildlife' except those specified. Corals are not included on the list of wildlife which may be exported, although sea shells are.

Israel: All corals are protected and trade is prohibited (Perry *in litt.*, 13.3.89).

Malaysia: In November 1986, Parties to CITES were notified that coral exports from Sabah are illegal.

Maldives: There is no formal legislation but collection of marine organisms around most resort islands is strongly discouraged by dive and tourist operators.

Netherlands Antilles: Collection of corals is prohibited.

New Caledonia: Coral collection was previously restricted to Fungia species and branches of *Acropora* weighing less than 300 gm. It is now authorised on a trial basis under

Délibération 509 of 16.12.82 and Arrêté 85-321/CM of 19.6.85 on Tetembia reef only; 18 genera and the family Faviidae may be collected under permit.

Papua New Guinea: The collection of corals (and other marine organisms) is prohibited within marine parks and protected areas under the Conservation Areas Act 1978, the Fauna (Protection and Control) Act 1966 and the National Park Act 1982. Trade and exploitation are regulated under the Customs Regulation Act 1973 and the Fisheries Act 1977 (Kisokau in litt., 8.3.89).

Philippines: Presidential Decree (P.D.) 1219 of 1977 banned all collection and export of ordinary or hermatypic corals except under special permit for scientific and educational purposes. In 1980, P.D. 1698 provided tighter controls by banning the transport and possession of ordinary corals. In 1986, under pressure from the coral traders who maintained that they needed to clear stocks of hard corals collected prior to the imposition of the ban, it was announced that exports would be permitted for one year, from May 1, 1986 to April 30, 1987. However, the ban was re-imposed on 22 November 1986 after only seven months when it was discovered that freshly collected coral was being exported. All Parties to CITES were clearly notified in November 1988 of the re-imposition of the ban and were urged to help the Philippines implement this by rejecting any application for importation of corals from this country and to inform the CITES Secretariat of any attempt to circumvent the ban.

Puerto Rico: Collection of corals has been prohibited since October 1979 except for scientific, educational and some commercial purposes (Sadovy, in litt., 23.11.1984). Although the laws are reportedly rarely enforced, since they came into force there had been a marked decrease in coral collecting. The penalty for extraction, possession, transport and sale of coral is not more than six month imprisonment and/or a fine of not more than $ 500.

Sudan: Collecting of corals is prohibited.

South Africa: Coral may be collected only under licence and only for scientific purposes.

USA: Under Federal Law, collecting permits are issued only for educational and scientific purposes, and collection, damage or sale of stony (i.e. hard) corals (Millepora sp. and Scleractinia) is prohibited. In 1982 corals were included under the Lacey Act, which bands the import into the USA of illegally taken or exported wildlife products. Imports of Philippine raw, processed and finished stony corals are specifically prohibited, as of 10.2.89, under a notification published in the Federal Register 54 (27), 1989 (p. 6455).

Vanuatu: The coral trade is regulated by the Fisheries Act 1982 and subsequent Fisheries Regulations Order No. 49 of 1983. No person shall take more than three pieces of living coral in any period of 24 hours except with the permission of the Director of Fisheries; no coral may be exported without written permission of the Minister of Fisheries (Chambers in litt., 22.3.89).

42. International: At present 17 genera are listed in Appendix II of CITES. These are: Seriatopora, Pocillopora, Stylophora, Acropora, Pavona, Fungia, Polyphyllia, Halomitra, Favia, Platygyra, Merulina, Lobophyllia, Pectinia, Euphyllia, Millepora, Heliopora, Tubipora.

43. Additional Protection Needs: Hard corals other than the 17 genera listed in Appendix II of CITES are involved in trade and are also vulnerable to over-exploitation as described above. Furthermore, because of the difficulty in identifying corals to generic or species level it is preferable to list all hard corals. This policy has been adopted in most countries where legislation exists to control coral collection, sale and export.

Although a total ban on the ornamental coral trade has been recommended on several occasions (Gomez, 1982/3; Wells and Alcala, 1987), it appears that coral resources could support an appropriately managed harvest (Grigg, 1984). Wells and Alcala (1987) and Wood and Wells (1988) give more detailed recommendations for the management of the trade which include licensing of commercial collectors and the monitoring of collecting areas and of the trade. Additional protection measures include the creation of marine parks and the improvement of pollution controls. Management of coral reef resources is discussed in Salam and Clark (1984), Kenchington and Hudson (1984) and, on a country by country basis, UNEP/IUCN (1988/9).

Grigg (1984) discusses the potential for management of hard corals on sustainable yield basis using as an example Pocillopora verrucosa, one of the commercially important species in the Philippines. It was estimated that in order to achieve the maximum sustainable yield, the minimum size of a colony at harvest should be 18 cm height, which in this species is reached after about six years. Oliver and McGinnity (1985) have used estimates of gross production for Polcillopora damicornis on Galapagos reefs, calculated by Glynn et al. (1979), to estimate productivity for Australian reefs where collecting is taking place. Working on a basis of 20% coral cover they suggest that annual production from a 400 m x 10 m licence area would be 8 tonnes. This is close to the actual harvest of this species by the two major collectors on the Great Barrier Reef. It is suggested that multiple census techniques are required to directly measures recruitment, mortality, fragmentation and other means of asexual reproduction.

As mentioned in para. 34., sustainable yield has also been calculated for the licensed reef in New Caledonia. In the USA, a fishery management plan has been drawn up by the US National Marine Fisheries Services for the Gulf of Mexico and South Atlantic (i.e. not Caribbean) reefs under US jurisdiction. This requires the establishement of Habitat Areas of Particular Concern (HAPCs) for corals which are currently or potentially threatened, and the banning of collection or destruction of hard and soft corals and seafans, apart from licensed collecting for scientific purposes (Anon., 1982).

Transplantation of hard corals and cutting has been investigated experimentally in the Philippines (Auberson, 1982; Yap and Gomez, 1988) and in Australia (Harriott and Fisk, 1988). This appears

to be biologically feasible, survival rates of 50-100% being possible, depending on species and location. However, at present, the process is so expensive that it is only considered a viable option for repairing reef damage in areas of very high commercial value, such as at popular recreational and tourist sites, or to stock aquariums with live coral.

5. Information on Similar Species

A number of other taxonomic groups are referred to as corals but these - false corals (order Corallimorpharia), soft corals (order Alcyonacea), black corals (order Antipatharia) and precious corals (order Gorgonacea) - can be readily distinguished from the hard corals.

False corals have soft parts resembling scleractinian corals, but have no skeleton. Soft corals are fleshy when alive, and the skeleton consists of calcareous spicules embedded in the body of the animal. These spicules are small and disjointed, and do not form a solid skeleton as in hard corals. False and soft corals occur in trade only as live specimens for aquaria.

Black corals occur in trade and are listed in Appendix II; they are easily distinguishable from hard corals, having a flexible, internal skeleton made of a horny non-calcareous material. Precious corals are also important in trade but are not listed in CITES. They too are easily distinguishable from hard corals, having a skeleton that is calcareous but, unlike hard corals, it is jointed and without pits or cavities, although the surface may be striated. Hard corals have a non-jointed, calcareous skeleton that lies externally to the polyps. Despite considerable variation in the structural design of the skeleton there are always pores, cavities or tubes in which the polyps are situated.

6. Additional Remarks

Israel is prepared to put forward this proposal because of the extremely diverse and economicaly important reef which fringes the Red Sea coastline of this country. Coral collecting in Israel is prohibited. The listing of all corals in Appendix II may discourage the illegal collection of domestic corals, which can currently be sold under the guise of imported corals.

In addition to listing those corals which are of as much concern as those already in Appendix II, this proposal covers a large number of species which should be listed for look-alike reasons. As mentioned above, corals are very difficult to identify to species and genus. The enforcement of CITES regulations with respect to the current listing of 17 genera is extremely difficult as testified by the recent case involving a consignment of Philippine corals entering Portugal (Ramos in litt., 17.3.89).

Concern about the impact of the coral trade is evident from the number of countries with legislation to control and prohibit exploitation. Israel, the Philippines and the USA, all countries with important reefs, prohibit the collection and export of corals. In Australia, export is only permitted in accordance with an approved management plan; as yet no approved management plans have been developed and no coral is exported. The study of corals is a recent branch of science. There is still comparatively little information available on coral

life cycles and biology on which to base management strategies for sustainable yields. Until such strategies can be developed and implemented, it is essential to monitor and control coral exploitation. Listing of hard corals in Appendix II is one of the few ways of doing so at present.

There is concern that marine invertebrates, even when heavily exploited, do not meet the Berne Criteria for Appendix II. Many marine invertebrates produce large numbers of young which are dispersed in the oceans' plankton, often over enormous distances. This means that they may have wide distributions and considerable potential for replenishment of exploited stocks. Neverthless, some species appear to have narrow distributions and to be true 'endemics'. At present information on the biogeography of reef corals is still very scanty compared to that for terrestrial organisms, and caution is required before making broad generalisations.

The order Antipatharia (black corals) and 17 genera of hard corals are already listed in Appendix II. This indicates that the Conference of the Parties accepts that corals can meet the Berne Criteria or that, if they do not, the problems facing them and the level of trade is sufficiently serious that they should be listed nonetheless. The corals currently listed fulfil the Criteria in a number of ways:

- there is some indication that they are threatened through decreasing population size as a result of habitat destruction, heavy trade and other threats such as pollution (biological status);

- they are heavily traded in and trade has increased over recent years (trade status).

These Criteria also apply to many hard corals not listed at present, which are the subject of this proposal.

Comments and queries associated with earlier proposals to list all corals in Appendix II were such that it is important to be quite clear of the definition of the word 'coral'. It has been suggested that corals, by definition, are excluded from consideration by CITES. However, a coral, either solitary or colonial, is an animal and may therefore be considered by CITES. A colonial coral specimen would always be referred to in the singular (animal), despite the fact that it is made up of many polyps.

The word 'coral' is loosely applied to a range of different coelenterates, as described in Paragraph 1. 'Hard coral' is used to describe those that have an external skeleton of calcium carbonate. This is secreted by the coral polyp(s), is added to as the coral grows, and is an integral and essential part of the animal, just as an internal skeleton is considered an integral part of other animals. It has been suggested that the skeleton is an excretory product. This is not the case as this term is restricted to unwanted waste shed from an animal as a by-product of metabolic activities. The word 'coral' in this proposal refers to both, or either, the soft structures [polyp(s)] and the skeletal material.

7. Comments from Countries of Origin

Comments have been solicited from the major range states. The following have been received.

Australia: Export trade from Australia appears to be restricted to tourist souvenir specimens.

Papua New Guinea: This country has expressed support for the proposal.

Vanuatu: Vanuatu is in favour of the proposal, believing that regulation and monitoring of coral trade is necessary to conserve stocks. At the moment there is not the expertise in Vanuatu to accurately identify those species already listed in CITES Appendix II and thus the present proposal to add look-alike species would simplify matters. One obvious disadvantage of the proposal however, is that with all the species being limped together, there may be no records of the amount of actually endangered species being traded. At the moment there is no commercial trade of corals in Vanuatu.

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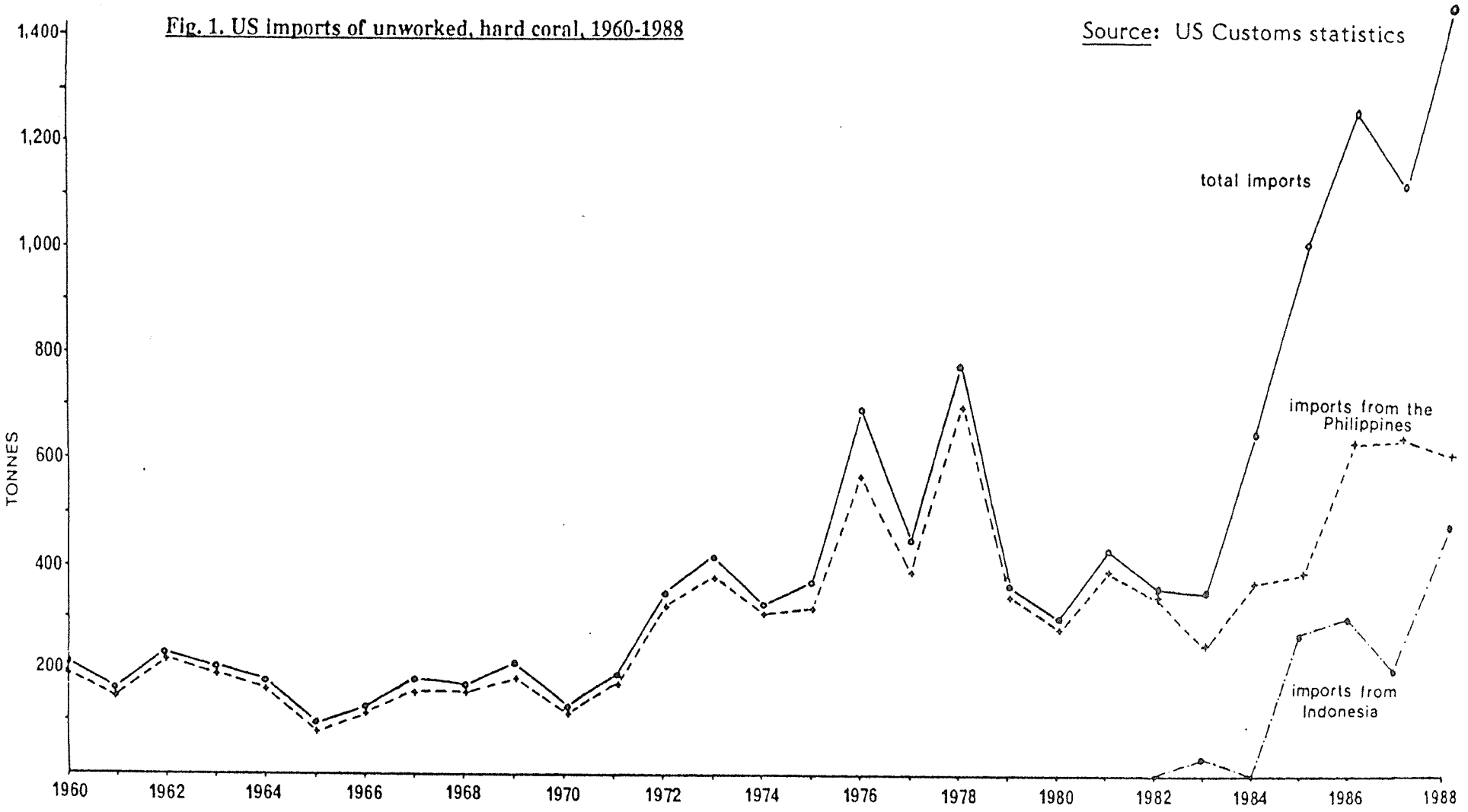
Fig. 1. US imports of unworked, hard coral, 1960-1988

Source: US Customs statistics



APPENDIX

LIST OF REEF-ASSOCIATED GENERA AND FAMILIES IN THE ORDERS SCLERACTINIA, ATHECATA, COENOTHECALIA AND STOLONIFERA

This list is compiled from Wood (1983) and Veron (1986). Since coral taxonomy is a rapidly changing field, it should be regarded as a provisional list only and subject to change. It is intended only as a guide.

CLASS ZOANTHARIA	
ORDER SCLERACTINIA	
Family ASTROCOENIIDAE	
Stephanocoenia	West Atlantic
Stylocoeniella	Indo-Pacific, Red Sea
Family POCILLOPORIDAE	
Madracis	Indo-Pacific, Red Sea, Gulf, Atlantic
Palauastrea	west Pacific
Pocillopora	Indo-Pacific, Red Sea, Gulf
Seriatopora	Indo-Pacific, Red Sea
Stylophora	Indo-Pacific, Red Sea, Gulf
Family ACROPORIDAE	
Acropora	Indo-Pacific, Red Sea, Gulf, Carib.
Anacropora	west Pacific, S.E. Asia
Astreopora	Indo-Pacific, Red Sea
Montipora	Indo-Pacific, Red Sea, Gulf
Family AGARICIIDAE	
Agaricia	west Atlantic
Coeloseris	west Pacific, S.E. Asia
Gardineroseris	Indo-Pacific, Red Sea
Leptoseris	Indo-Pacific, Red Sea, Caribbean
Pachyseris	Indo-Pacific, Red Sea
Pavona	Indo-Pacific, Red Sea, Gulf
Family SIDERASTREIDAE	
Anomastraea	west Indian Ocean
Coscinaraea	Indo-Pacific, Red Sea, Gulf
Horastrea	E. Africa, Madagascar
Psammocora	Indo-Pacific, Red Sea Gulf
Pseudosiderastrea	S.E. Asia
Siderastrea	Atlantic, Red Sea, Gulf, west Ind.Oc.
Family FUNGIIDAE	
Cycloseris	Indo-Pacific, Red Sea, Gulf
Diaseris	??
Fungia	Indo-Pacific, Red Sea
Halomitra	Indo-Pacific
Heliofungia	west Pacific, S.E. Asia
Herpolitha	Indo-Pacific, Red Sea
Lithophyllon	west Pacific, S.E. Asia
Podabacia	Indo-Pacific, Red Sea
Polyphyllia	Indo-Pacific
Sandalolitha	Pacific, S.E. Asia
Zoopilus	west Pacific
Family PORITIDAE	
Alveopora	Indo-Pacific, Red Sea
Goniopora	Indo-Pacific, Red Sea, Gulf
Porites	Indo-Pacific, Red Sea, Gulf, Atlantic
Stylaraea	Indo-Pacific

Family FAVIIDAE	
Astreosmilia	Indo-Pacific
Australogyra	Indo-Pacific
Barabattoia	Indo-Pacific
Caulastrea	Indo-Pacific
Cladocora	Caribbean, East Pacific
Colpophyllia	Caribbean
Cyphastrea	Indo-Pacific, Red Sea, Gulf
Diploastrea	Indo-Pacific, Red Sea
Diploria	Caribbean
Echinopora	Indo-Pacific, Red Sea
Favia	Indo-Pacific, Red Sea, Gulf, W.Atl.
Favites	Indo-Pacific, Red Sea, Gulf
Goniastrea	Indo-Pacific, Red Sea
Leptastrea	Indo-Pacific, Red Sea, Gulf
Leptoria	Indo-Pacific, Red Sea
Manicina	Caribbean
Montastraea	Indo-Pacific, Red Sea, Atlantic
Moseleya	S.E. Asia
Oulastrea	S.E. Asia
Oulophyllia	Indo-Pacific, Red Sea
Platygyra	Indo-Pacific, Red Sea, Gulf
Plesiastrea	Indo-Pacific, Red Sea, Gulf
Solenastrea	Caribbean
Family TRACHYPHYLLIIDAE	
Trachyphyllia	Indo-Pacific, Red Sea
Wellsophyllia	Indian Ocean, S.E. Asia
Family MEANDRINIDAE	
Dendrogyra	Caribbean
Ctenella	Indian Ocean
Dichocoenia	Caribbean
Goreaugyra	Florida, Bahamas
Meandrina	west Atlantic
Family OCULINIDAE	
Acrhelia	West Pacific, S.E. Asia
Galaxea	Indo-Pacific, Red Sea
Oculina	Caribbean
Family MERULINIDAE	
Boninastrea	Pacific
Hydnophora	Indo-Pacific, Red Sea, Gulf
Merulina	Indo-Pacific, Red Sea
Paraclavarina	Pacific
Scapophyllia	west Pacific, S.E. Asia
Family MUSSIDAE	
Acanthastrea	Indo-Pacific, Red Sea, Gulf
Australomussa	Indo-Pacific
Blastomussa	Indo-Pacific, Red Sea, Gulf
Cynarina	Indo-Pacific, Red Sea
Isophyllastrea	Caribbean
Isophyllia	Caribbean
Lobophyllia	Indo-Pacific, Red Sea
Mussa	Caribbean
Mussismilia	Brazil
Mycetophyllia	Caribbean
Scolymia	West Pacific, Ind. Oc., W. Atl.
Symphyllia	Indo-Pacific, Red Sea
Family PECTINIDAE	
Echinophyllia	Indo-Pacific, Red Sea, Gulf
Mycedium	Indo-Pacific, Red Sea
Oxypora	Indo-Pacific, Red Sea
Pectinia	Indo-Pacific
Physophyllia	Philippines, E. Africa, Maldives

Family CARYOPHYLLIDAE	
Cataleophyllia	S.E. Asia, West Pacific
Euphyllia	Indo-Pacific, Red Sea
Eusmilia	Caribbean
Gyrosmilia	Red Sea, E. Africa
Heterocyathus	Indo-Pacific
Montigyra	Indo-Pacific
Physogyra	Indo-Pacific, Red Sea
Plerogyra	Indo-Pacific, Red Sea
Family DENDROPHYLLIDAE	
Balanophyllia	Indo-Pacific
Dendrophyllia	Indo-Pacific
Duncanopsammia	Indo-Pacific
Heteropsammia	Indo-Pacific
Tubastraea	Indo-Pacific
Turbinaria	Indo-Pacific, Red Sea, Gulf
CLASS HYDROZOA	
ORDER ATHECATA	
Family MILLEPORIDAE	
Millepora	Indo-Pacific, Red Sea, W. Atl.
Family STYLASTERIDAE	
Stylaster	Indo-Pacific, West Atlantic
Distichopora	Indo-Pacific, Red Sea
CLASS ALCYONARIA	
ORDER COENOTHECALIA	
Family HELIOPORIDAE	
Heliopora	Indo-Pacific, Red Sea
ORDER STOLONIFERA	
Family TUBIPORIDAE	
Tubipora	Indo-Pacific, Red Sea