

APPENDIX 1: COUNTRY PROFILES

[DRAFT FOR ADDITION AND AMMENDMENT MAY 2001]

MARINE ORNAMENTAL FISHERIES: STATUS, TRADE AND MANAGEMENT

	SIZE , STATUS AND PROFILE OF FISHERY	EXPORT MARKET VOLUME AND VALUE OF TRADE	REGULATIONS, MANAGEMENT AND MONITORING
WESTERN ATLANTIC AND CARIBBEAN			
USA: FLORIDA	<ul style="list-style-type: none"> • Domestic use and export • Large scale • About 100-125 full time collectors. • 180 species of fish are collected. • Collection is in Florida Keys including Marine Sanctuary 	<ul style="list-style-type: none"> • Total dockside value of 'ornamental' landings from State and adjacent Federal waters peaked at \$4.3 million in 1994 (Lee <i>et al.</i> 1999) but approximately 50% of commercial landings (by value) from 1990-98 were obtained from live rock and live sand collected in Federal waters. The economic importance of fish species fell from 54% in 1990 to 25% in 1998. Of the 47 major fish groups, angelfish accounted for 55% of the total landed value (Lee <i>et al.</i> 1999). • 191,567 fish were collected in Florida State in 1996 (source: State of Florida's 1996 reports from commercial tropical fish collectors). 	<ul style="list-style-type: none"> • Florida Marine Fisheries Commission manages the recreational and commercial harvest of ornamental marine tropical fish, shellfish and plants, including licensing requirements, bag and size limits, allowable gear, and a live landing law (Delaney, pers. comm. 1998). • Collectors are licensed and are required to submit catch data to the State Department of Environmental Protection yearly. They operate under State legislation, the <i>Marine Life Rule</i> (Department of Commerce, 1997). Initially, the regulations applied only to State waters, but since July 1st, 1997, the Marine Life Rule has also been incorporated in Federal waters (Delaney, pers. comm. 1998). • The Marine Life Rule lists all 'ornamental' species as 'restricted' species. In summary this: <ul style="list-style-type: none"> ▪ sets minimum and maximum size limits for butterflyfish, angelfish and some other species. ▪ sets a daily <i>recreational</i> bag limit for fish, invertebrates and plants (no more than 20 individuals of ornamental species and including no more than 5 angelfishes. ▪ sets daily <i>commercial</i> limit for angelfishes and butterflyfishes (e.g. a limit of 75 angelfish/person/day or 150/vessel/day). • Mesh-size must not exceeding 3/4 inch stretched mesh and quinaldine can only be used by special permit (issued by the State Department of Environmental Protection). The concentration allowed is 2%. • Certain areas in the Sanctuary are designated as 'no-take' areas. These are part of the Sanctuary's comprehensive Marine Zoning Plan, implemented in 1997. The no-take areas are fairly small (0.25 to 9 sq. nautical miles in area) and protect the most popular shallow reef habitats of the Keys (Delaney, pers.comm. 1998). Commercial and recreational fishermen are not allowed to harvest any species from these areas.

BAHAMAS	<ul style="list-style-type: none"> • Export • Small scale 	<ul style="list-style-type: none"> • Mainly exporting to the USA 	<ul style="list-style-type: none"> • The Department of Fisheries is the regulatory body, and does not generally allow exports of marine ornamentals. There are a few exceptions, in special circumstances to allow for collection of specimens for aquariums for public display purposes. In such cases, collecting permits are issued wherever possible, and the Department tries to have a fisheries officer present on the collecting cruises (Phillips, pers. comm.. 2000).
CUBA	<ul style="list-style-type: none"> • Export • Small scale • Started in the late 1990s 	<ul style="list-style-type: none"> • Mainly exporting to the USA 	
JAMAICA	<ul style="list-style-type: none"> • Export (in past) • Small scale • Stopped in 1990. 		<ul style="list-style-type: none"> • The Natural Resource Conservation Authority has a regulatory structure for the collection and export of wildlife, and stopped issuing permits to export marine aquarium fish because it considered that the Jamaican marine system was stressed and overfished and because there was a severe lack of funding to conduct surveys (Johnston, pers. comm.. 2000).
DOMINICAN REPUBLIC	<ul style="list-style-type: none"> • Export • Medium scale 		
HAITI	<ul style="list-style-type: none"> • Export • Medium scale • Probably over 20 exporters (Weiner, pers. comm.. 2000). 	<ul style="list-style-type: none"> • Most of the stock is exported to Maimi, USA (Thomson and West, pers. comm.. 2000). • No records are available for value or numbers of fish exported (Weiner, pers. comm.. 2000). 	<ul style="list-style-type: none"> • There are no controls on collecting or export (Weiner, pers. comm.. 2000).
PUERTO RICO	<ul style="list-style-type: none"> • Export • Large scale (in past) • Trade began in early 1970s • Trade suspended in 1999, but currently operating again at a lower, restricted level (Lilyestrom, pers. comm.. 2001). 	<ul style="list-style-type: none"> • Most of the exports go the US mainland, the rest to European and other countries (Sadovy, 1992) • In the early 1990s exports comprised about 160,000 – 200,000 animals annually (including invertebrates), involving 104 fish species, with 5 species and assorted blennies taking 70% of the total (Sadovy, 1992). 	<ul style="list-style-type: none"> • In the early 1990s the trade was not regulated or monitored, and neither collectors nor exporters were licensed (Sadovy, 1992). There was concern at this time about the possible impact of the growing export trade. • In 1999, commercial collection was suspended under the Coral Conservation Law (Law 147 of 15 July 1999). One of the articles specifically prohibits sale of wild-caught organisms of the type used in aquariums, thus making it permissible to catch ornamental fish or invertebrates for personal use, but not for sale. Based on this law the Dept. of Natural & Environmental Resources (DENR) denied requests for renewal of existing capture permits (Lilyestrom, pers. comm.. 2000). However, after a Court hearing, the DNER issued collecting/export permits to 12 collectors. The permits include restrictions on species (total of 30+ species between fish and inverts), locations, gear, seasonal area closures (in some cases), daily quotas, advance information on where collecting will take place and monthly reports. The collectors requested a reconsideration, however, DNER reaffirmed its position. • An up-to-date analysis of the trade is currently being carried out (Lilyestrom, , pers. comm.. 2000).

MARTINIQUE	<ul style="list-style-type: none"> • Export • Small scale 	<ul style="list-style-type: none"> • Mainly export to France, with some to the Netherlands. European countries imported stock from Martinique worth between US\$ 52,000 – 85,000 annually (cif value) from 1992 - 1998, but there were no imports recorded for 1997 and 1998 (Eurostat data). 	
BARBADOS	<ul style="list-style-type: none"> • Export • Small scale • One company 	<ul style="list-style-type: none"> • Exports go exclusively to the UK (West, pers comm, 2000). • Stock imported to the UK from Barbados was worth between US\$ 11,000 – 36,000 annually (cif value) from 1992 - 1998 (Eurostat data). 	
NETHERLANDS ANTILLES	<ul style="list-style-type: none"> • Export • Medium scale • Established on Curacao; not permitted on Bonaire (De Meyer, pers. comm. 1998). • There used to be 5 collectors on Curacao in the mid-1990s, but only 2 were operating in 2000 (Pors, pers. comm. 2000). • The Curacao Seaquarium occasionally exports live specimens to a commercial wholesaler (Hoetjes, pers. comm, 2000). 	<ul style="list-style-type: none"> • Exports go mainly to Holland and Germany (Pors, pers. comm. 2000). • Eurostat data show that European countries imported marine ornamental fish worth between US\$ 10,000 – 102,000 annually (cif value) from 1992-1998. Some of these may be re-exports, because the most active collector also imports fish from the Dominican Republic for export to Europe (Hoetjes, pers. comm, 2000). • Between 1978 – 1989, the number of fish exported annually ranged from 5,388 to 23,375 (data from Pors, pers comm. 2000). 	<ul style="list-style-type: none"> • There are no restrictions or regulations for collecting or collecting localities. • There are no legal restrictions on the export of non-CITES species, although in practice Customs will not allow export unless live shipments of marine ornamentals are accompanied by a no-objection statement from the CARMABI Foundation (Ecological Institute, Curacao) (Hoetjes, pers. comm, 2000). • Legislation imposing a registration obligation for every shipment was cancelled in 1999 without approval of the Department of Public Health and Environment (Pors, pers comm. 2000). • Curacao is required to pass new nature conservation legislation before the end of 2001 and some restrictions on collecting will probably be part of that (Hoetjes, pers. comm, 2000).
MEXICO	<ul style="list-style-type: none"> • Domestic use and export • Medium scale. • Fishery established by the late 1980s. A few local and several pirate collectors (mostly American) worked in the Baja California Sur area, and also made trips to the Revillagigedo Islands during 1990-1991 (Ketchum, pers. comm. 2000). • In the mid 1990s, commercial aquarium 	<ul style="list-style-type: none"> • Data on value of exports are numbers of fish collected and exported are not readily available. • Popular species include <i>Holacanthus passer</i>, <i>Opisthognathus rosenblatti</i> (endemic) and <i>Thalassoma lucasanum</i>. The main reason for visiting the Revillagigedo Islands was to collect Clarion angels <i>Holacanthus clarionensis</i> (Ketchum, pers. comm. 2000). 	<ul style="list-style-type: none"> • Surveys were carried out around the Revillagigedo Islands during the time that at least 1,000 clarion angelfish (<i>Holacanthus clarionensis</i>) were being taken by each boat. Results showed that numbers had decreased by up to 95% in some areas (Almenara-Roldan & Ketchum, 1994). • The Revillagigedos were declared a protected area in 1994 and collecting was banned. However, because of the isolation of the islands, the lack of enforcement within the reserve and the fact that sportfishing and commercial fishing boats visit periodically without any permit or regulation, it is thought that pirate collecting may still occur (Ketchum, pers. comm. 2000). • In the mid 1990s, commercial aquarium fisheries were prohibited throughout Mexico because they had operated for years without any monitoring being carried out to investigate the effects on populations of

	<p>fisheries were prohibited throughout Mexico, but recently (1999?) re-opened in Baja California. Two local collectors currently have permits.</p> <ul style="list-style-type: none"> Collection still occurs for the domestic market on the reefs around Veracruz City). 		<p>targetted species (Bonilla, pers. comm. 2000). However, the ornamental fisheries in Baja California were recently re-opened (1999?) but there are now a number of restrictions for the local collectors imposed by the fisheries department such as the requirement to supply basic information on the fish populations, collecting areas, etc. Collectors have had to hire researchers to do the assessments, but this is costly and in some cases sufficiently highly trained personnel have not been hired because of the cost (Ketchum, pers. comm. 2000).</p> <ul style="list-style-type: none"> Collection still occurs for the domestic market on the reefs around Veracruz City) and Veracruz Aquarium is doing a preliminary study of the effects of this activity (Morales, pers. comm. 2000).
BELIZE	<ul style="list-style-type: none"> Export Medium scale. Began in the 1970s (McField <i>et al.</i> 1996) The fishery has not been expanded to its maximum potential because of environmental concerns. In 1995 five licences were issued, but only 3 were operational. 	<ul style="list-style-type: none"> In 1994 over 27,000 fish and inverts were exported with a value of over BZ\$80k (McField <i>et al.</i> 1996) 	<ul style="list-style-type: none"> The Fisheries Dept. is in charge of issuing licenses to collectors and exporters of marine aquarium fish (Gibson, pers. comm. 2000).
HONDURAS	<ul style="list-style-type: none"> Export Small scale Collecting operation around the Bay Islands has opened up fairly recently. 	<ul style="list-style-type: none"> Exports go mainly to the USA (Thomson & West, pers. comm. 2000). 	
COLOMBIA	<ul style="list-style-type: none"> Export Small scale 	<ul style="list-style-type: none"> European countries imported stock worth between US\$ 2,000 - 12,000 annually (cif value) from 1992-1998 (Eurostat data), and stock is also sent to the USA. 	
VENEZUELA	<ul style="list-style-type: none"> Export Small scale 	<ul style="list-style-type: none"> Stock is exported to the US (Thomson & West, pers. comm. 2000) 	
SURINAM	<ul style="list-style-type: none"> Export Small scale 		
FRENCH GUYANA	<ul style="list-style-type: none"> Export Small scale 		

<p>BRAZIL</p>	<ul style="list-style-type: none"> • Export • Large scale • There are no estimates for the total number of collectors in Brazil, but they are known to operate from the State of Santa Catarina to the State of Ceará (Monteiro-Neto <i>et al.</i> 2000). • Fish are exported from centres such as Fortaleza (Ceará) on the north coast and Recife, Salvador and Rio de Janeiro on the east coast. • There are 23-25 wholesalers dealing in marine fishes (they may also sell freshwater species) (Monteiro-Neto <i>et al.</i> 2000). 	<ul style="list-style-type: none"> • Data collected by Monteiro-Neto <i>et al.</i> 2000 show that the USA is the most important export market. For example, 78% of fish exported from Ceará went to the USA. • European Community countries also take a significant amount of stock. Imports to the EC from Brazil were valued at between US \$ 69,000 – 302,000 annually (cif value) between 1992 – 1998 (Eurostat data). • The total number of fish collected and exported is unknown, but a total of 35,020 fish were exported from Ceará between January 1995 to June 1997 (Monteiro-Neto <i>et al.</i> 2000), equivalent to about 12,000 annually (Monteiro-Neto <i>et al.</i> 2000). • 50 species and a further unknown number of species belonging to 6 genera are exported from Brazil. Queen angelfish (<i>Holacanthus ciliaris</i>) and French angelfish (<i>Pomacanthus paru</i>) correspond to about 68% of total trade by number of individuals: <i>Holacanthus tricolor</i>, <i>Chaetodon ocellatus</i>, <i>Pseudopenaeus maculatus</i> and <i>Bodianus rufus</i> are the next most important, together comprising less than 6.5% of the total number of fishes traded. Other species such as seahorses and <i>Gramma brasiliensis</i> may be important locally in certain states (Monteiro-Neto <i>et al.</i> 2000). 	<ul style="list-style-type: none"> • A permit from the national environment agency IBAMA (Instituto Nacional do Meio Ambiente e dos Recursos Naturais Renováveis). is required for collection and export of any species in Brazil, and sometimes from the State Environmental Authority (varies according to the State in which the activity is to be developed). • In February 1997, the official list of endangered fauna of Sao Paulo State (S-E Brazil) was published by the State Government of Sao Paulo, act 42.838/98, and includes several species of reef fishes. This list was produced by local scientists, based on IUCN criteria and is intended to represent the local conservation status of the fauna. The inclusion of a given species in the "red" list will, supposedly, be considered by those agencies when a permit request is being analyzed. but apparently there is usually no difficulty in obtaining a permit (de Moura, pers. comm.1998). • Reef fish species included as endangered are: • <i>Heteroconger longissimus</i> (Congridae), <i>Ginglymostoma cirratum</i> (Ginglymostomatidae), <i>Chaetodon sedentarius</i> (Chaetodontidae), <i>Elacatinus figaro</i> (Gobiidae), <i>Ptereleotris helenae</i> (Microdesmidae), <i>Gramma</i> sp. (Grammatidae), <i>Centropyge aurantonotus</i>, <i>Holacanthus tricolor</i>, <i>Holacanthus ciliaris</i> (Pomacanthidae), <i>Epinephelus itajara</i> (Serranidae), <i>Hippocampus erectus</i> and <i>Hippocampus reidi</i> (Syngnathidae). • Collection is banned on the reefs south of Recife. (Coral Coast Marine Protected Area) because of concern about over-collecting and also the destruction of the reefs. There is very little scientific information about species abundance and distribution, therefore it is impossible to set reasonable catch quotas or predict how many fishes may be harvested. • Due to the large area, permit control and enforcement by the authorities are not effective, and most collectors are illegal. • Both wholesalers and retailers must be licensed by IBAMA to sell ornamental fish. • There are no standards on the type of installation required to hold marine ornamental fish.. • Action is being taken to address problems associated with the marine aquarium trade. The aim is to introduce standards and regulations and to carry out research. For example, to study fish stocks to see what damage has already been caused and the potential risks to natural populations, and what would be the alternatives to fishers involved in the activities (Monteiro-Neto pers. comm. 2000).
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RED SEA			
EGYPT	<ul style="list-style-type: none"> • Export • Small scale • Collection began in 1984 • There are 13 licensed collectors who are employed by a public sector company (The Egyptian Company for Fishing and Fishing Gear: ECFFG) which is affiliated to the General Authority for Fish Resources Development (GAFRD). Three private companies are also licensed to export fish (Barrania, 2000). • Most of the collecting is in El-tour, Abu-Rdes and around islands off Hurghada. 	<ul style="list-style-type: none"> • Exports go mainly to Japan, Singapore, Taiwan and Europe. In the first year (1984) a total of 721 fish were exported Barrania (2000). Exports rose fairly sharply to 17,412 fish in 1986 and then remained relatively constant until 1991 when a peak of 19,000 was recorded. • Numbers have fluctuated since then and declined to 6,257 in 1998, possibly due to competition with other countries in the region. According to Hariri <i>et al.</i> (2000) trade was affected by the high prices charged and the inferior quality of the product because of poor handling through Cairo. • Confusingly, Eurostat figures show imports from Egypt valued as high as US\$ 177,000 in 1998 and between US\$ 116 – 221 annually from 1992-1998. • Just over 50 species are on the export list, including 9 species of butterflyfish and 5 species of angelfish (Abdallah, 2000). 	<ul style="list-style-type: none"> • The Egyptian Company for Fishing and Fishing Gear (ECFFG) is the sole body authorised for collecting ornamental marine fish in Egypt. • Collectors are trained in a private training centre and have licences. • There are no restrictions on collecting areas. Exploration for new areas is under way. Collection is meant to be stopped for one or two years in each area ‘for biological rest’ (Barrania 2000).
ERITREA	<ul style="list-style-type: none"> • Export • Medium scale; but collection stopped in the late 1990s following renewal of hostilities with Ethiopia (Raines pers comm 2000). • The export trade from Eritrea began in 1995, but had been taking place at least in the early 1980s from what was then Ethiopia (Habte, 1997). • Initially, three companies were operating. • Most of the collecting was done in the vicinity of Massawa or the Dahlak Islands 	<ul style="list-style-type: none"> • When it was operating, 80% of the stock was exported to the USA, the rest to Europe and the Far East. • The trade involved 80 species, with 60,000 specimens being exported annually. Nearly two-thirds were damselfish, including over 25,000 <i>Chromis viridis</i> and <i>Dascyllus marginatus</i> (Daw <i>et al.</i> 1998). 	<ul style="list-style-type: none"> • When collection was occurring, the Ministry of Fisheries (MoF) inspected holding facilities regularly and kept data on the number, species and relative size of fish exported. MoF inspectors were increasingly being sent on collection trips to monitor sites fished and techniques used (Daw <i>et al.</i> 1998). • Export of corals or other invertebrates was prohibited. • Companies were charged 20% of the retail price of fish which was payable to the Eritrean Government.

SAUDI ARABIA	<ul style="list-style-type: none"> • Export • Small scale • Export began in 1997. • Five temporary licences were given, but it is not entirely clear how many are currently active. Hariri <i>et al.</i> (2000) report at least seven companies are involved in the collection and export of aquarium fish but Abdul-Ghani and Gazzaz, (2000) conclude only two are currently active. • Collection is along the Saudi Red Sea coastline, with centres at Tuwal, north of Jeddah, and Al-Shuaabah to the south (Abdul-Ghani and Gazzaz, 2000). 	<ul style="list-style-type: none"> • A total of 6,892 individuals were exported in 1998 and 14,058 in 1999 (Abdul-Ghani and Gazzaz, 2000). • Imports to the European Community countries from Saudi Arabia in 1998 were valued at US\$ 105,000 (Eurostat data). • Some of the fish are sent in the first instance to Sri Lanka, and then are transhipped to the consumer countries (pers. obs). • Fish belonging to 117 species were exported during 1998-1999 (Abdul-Ghani and Gazzaz, 2000). 	<ul style="list-style-type: none"> • The Fishery Department of the Ministry of Agriculture and Water issue licences, but there are no regulations for gear, season, location or species that can be taken (Abdul-Ghani and Gazzaz, 2000). • At least some of the collectors are foreigners with relevant expertise in fish collecting (for example from Sri Lanka or the Philippines).
YEMEN	<ul style="list-style-type: none"> • Export • Small scale • At least two companies and possibly as many as five are are licensed to collect coral reef fishes for the aquarium trade (Al Alawi, pers.comm.. 2000; Hariri <i>et al.</i> 2000). Abdallah (2000) reports that 3 centres are authorised to collect fish and another 3 are operating without licences. • There are many collecting areas such as Al-Zubier Islands and the islands near El-Hodeidah. Kemp (pers. Comm., 2000) reports collecting areas around the Kamaran islands. 	<ul style="list-style-type: none"> • The total volume of exports is unknown, but imports to European Community countries between 1992-1998 varied between zero and US\$ 217,000 annually. 	<ul style="list-style-type: none"> • In the late 1990s the fishery was not being monitored (Kemp, pers. comm.. 2000).

ARABIAN GULF			
BAHRAIN	<ul style="list-style-type: none"> Export Small scale A single company (Bahrain Aqualife Centre) collects ornamental fish. Collecting occurs all around the coast of Bahrain (Al Alawi, pers.comm. 2000). 	<ul style="list-style-type: none"> The export company also re-exports specimens imported from Saudi Arabia and Yemen. Value (cif) of local caught and re-exports combined was at a peak of US\$ 466,373 in 1994 and had declined to US\$ 21,640 in 1999 (Al Alawi, pers.comm. 2000). The numbers of fish exported was 20,986 in 1994 and 596 in 1999. About 40% of exports went to Japan, 20% to Hong Kong and 30% to other markets, but only 5% to the USA. The most popular are various species of angelfish (<i>Apothemichthys xanhotis</i>, <i>Pomacanthus asfur</i>, <i>P. maculosus</i>, <i>Pygoplites diacanthus</i>), butterflyfish (<i>Chaetodon austriacus</i>, <i>C.faciatus</i>, <i>C.melapterus</i>, <i>C.mesoleucos</i>, <i>C.nigropunctatus</i>, <i>C.semilarvatus</i>) tangs (<i>Acanthurus sohal</i>, <i>Zebrasoma xanthurus</i>), pseudochromids (<i>Pseudochromis aldabraensis</i>, <i>P.flavivertex</i>, <i>P.fridmani</i>), and wrasse (<i>Cheilinus lunulatus</i>, <i>C.undulatus</i> and <i>Larabicus quadrilineatus</i>) (Al Alawi, pers. comm. 2000). 	<ul style="list-style-type: none"> There is no license requirement, but permission to collect should be sought from the Directorate of Fisheries and Marine Resources (Uwate, pers. comm. 2000). The exporting company is licensed and registered with Ministry of Commerce and Bahrain Chamber of Commerce & Industry. (Al Alawi, pers. comm. 2000).
EAST AFRICA			
SOMALIA	<ul style="list-style-type: none"> There are plans by the private sector to collect ornamental fish in Somalia ((Hariri <i>et al.</i> 2000). 		
DJIBOUTI	<ul style="list-style-type: none"> One company is authorised to collect and export ornamental fish (Abdallah, 2000), but there is no information on the quantities collected or exported. It is possible that the fishery is not operating. 		<ul style="list-style-type: none"> A feasibility study was carried out in 1988 (Barratt & Medley, 1988) and it was concluded that there was a need for a systematic survey of the reefs in Djibouti and their stocks and that management plans for the aquarium fish industry should be developed before the industry expands.

<p>KENYA</p>	<ul style="list-style-type: none"> • Export • Medium scale • Collectors are employed by the exporters, and there were 65 registered fish collectors in 2000; but probably others also operating (McClanahan, pers. comm, 2000). • Currently about four companies are exporting fish and invertebrates (a reduction from a few years ago). • Collectors use a large suction pump for some fishes. • Collecting is mainly in the south of the country, around Shimoni. 	<ul style="list-style-type: none"> • Exports go to a range of countries particularly European countries, but including South Africa, Japan, Thailand and Hong Kong. • An important supplier of fish and invertebrates, but the trade is declining, apparently due to economic reasons. The number of live fish and invertebrates has fallen during the period 1995-1998 as follows: 1995: 203,300; 1996: 125,011; 1997: 119,687; 1998 24,493 (McClanahan, pers. comm, 2000). • Of the fish, the most numerous exported in 1998 was <i>Centropyge acanthops</i> (7326) (McClanahan, pers. comm, 2000), which is found only along the East African coastline (Allen, 1981). At least one third of the number of specimens exported in 1998 were invertebrates, especially sponges and anemones. 	<ul style="list-style-type: none"> • Exporters and collectors are licenced, but there are probably some collectors operating without a permit. (McClanahan, pers. comm, 2000). The export premises are not licenced. • Collection of corals is prohibited, and collecting of fish and invertebrates is not permitted in the marine parks and (but some still goes on). There are no other restrictions. • (McClanahan, pers. comm, 2000). • Exporters do their own training, there is none by the government or NGOs. • There is an export fee of 0.5% of the market value and this goes to the Fisheries authority (McClanahan, pers. comm, 2000).
<p>TANZANIA</p>	<ul style="list-style-type: none"> • Export • Medium scale in past • A small scale operation has operated here but the fishery is currently closed (Thomson, pers. comm. 2000). 		
<p>MOZAMBIQUE</p>	<ul style="list-style-type: none"> • Export • Small scale in past • Trade began in 1998 when a largely South African run company obtained permission to collect ornamental species. Transport was by road and mortalities were reported to be high (Whittington, pers. comm. 2000). • Collecting was mainly around Inhambane in the 	<ul style="list-style-type: none"> • There were no export facilities in Mozambique and stock was taken to South Africa where it was sold on the local market and also exported overseas (Bok, Seaworld, Durban, pers. comm. 1998). • Figures for numbers or value of specimens in trade do not exist. • Collectors caught whatever they could. Butterflyfish, angelfish, pomacentrids and the blue-streaked cleaner wrasse were popular. Anemones were taken along with the fish. 	<ul style="list-style-type: none"> • When collection began in 1998 the trade as a whole was very unregulated and a large percentage of the fish were smuggled across the border to South Africa (Whittington, pers. comm. 2000). • Collectors used nets without the aid of cyanide or other drugs, but there were no training initiatives. It was against the law to use scuba equipment for the capture of any marine organisms in Mozambique. The existing company, based close to Inhambane had its license withdrawn due to breaches of fishing regulations (Whittington, pers. comm. 2000). • Local fishermen and tour operators became concerned that collecting activities were having a major detrimental effect on the coral reefs of the area. In response to these concerns the government introduced a 2-year ban on the trade in ornamental fish and live corals in order to give time for management guidelines to be formulated (Whittington <i>et al.</i> 2000).

	<p>southern part of the country. Fish may also have been collected from the Quirimba Archipelago in the north (Whittington <i>et al.</i> 2000).</p> <ul style="list-style-type: none"> • A single company operated, but there were apparently four companies interested in setting up operations. At the time of the ban. 		<p>The ban has largely been respected although there have been a number of notable exceptions and legal action is underway over one particular case (Whittington, pers. comm. 2000).</p> <ul style="list-style-type: none"> • The reefs where collecting took place appear to have high populations of fish but there was worrying evidence of the removal of hard corals which was still very noticeable (Whittington <i>et al.</i> 2000). The Ministry for the Coordination of Environmental Affairs (MICOA) will be managing any further studies (Whittington, pers. comm. 2000)
SOUTH AFRICA	<ul style="list-style-type: none"> • Domestic use and export • Medium scale 		
INDIAN OCEAN			
MADAGASCAR	<ul style="list-style-type: none"> • Export • Small scale • Collection and export have recently started (Thomson pers. comm. 2000). 		
MAURITIUS	<ul style="list-style-type: none"> • Export • Small scale • There are two collecting companies in Mauritius 	<ul style="list-style-type: none"> • Exports are mainly to the Far East, South Africa, Reunion and Europe • 13,037 fish were collected in 1998 <p>[all information on Mauritius from Daby, pers. comm. 2000].</p>	<ul style="list-style-type: none"> • Licenses are required for both collecting and export premises, and the fishery is regulated by the Fisheries & Marine Resources Act, Sections 36 & 37 1998. • No collecting is allowed in marine reserve areas and dive sites. • Collection is with nets and no chemicals are permitted. There is no formal training for collectors.
SRI LANKA	<ul style="list-style-type: none"> • Export • Large scale • Well established by the 1960s • Up to 1,000 full and part-time collectors (Rajasuriya <i>et al.</i> 1999). • Collection is with hand nets and chemicals are not used, but there is no formal training. • Collection is currently mainly in the south-west and off the east coast. 	<ul style="list-style-type: none"> • Exports go to over 40 countries (Wood, 1985). • Export value of all ornamental specimens in 1994 was Rs 248 million (approximately US\$ 5.76 million), with locally caught marine specimens probably accounting for at least half of this total (Wood, 1996). Imports of marine fish to the EC from Sri Lanka in the 1990s have been over US \$1 million annually (Eurostat data). This includes some fish originating from the Maldives and Red Sea. • Around 200 fish species are used (Wood and Rajasuriya, 1999); the most important is the cleaner wrasse <i>Labroides dimidiatus</i>, with over 20,000 specimens exported annually (Wood & Rajasuriya, 1999). 	<ul style="list-style-type: none"> • Collectors do not have to be licenced, and there is no formal training. • Collecting is not allowed in marine protected areas, and in security zones, but there are no restrictions in other areas. • Collection is with nets and no chemicals are used. • The Moxy net is banned under the Fisheries and Aquatic Resources Act 1996, but implementation is lax (Rajasuriya, pers. comm. 2000). Seven fish species (also corals and certain invertebrates) are completely protected under both the Fauna and Flora Protection Ordinance and the First Schedule of the Fisheries and Aquatic Resources Act, No 2 of 1996, due to their rarity in Sri Lanka. The species are <i>Chaetodon semeion</i> (Chaetodontidae); <i>Centropyge bispinosus</i> and <i>Pygoplites diacanthus</i> (Pomacanthidae); <i>Coris aygula</i> and <i>Labroides bicolor</i> (Labridae); <i>Pterois radiata</i> (Scorpaenidae); <i>Platax pinnatus</i> (Ephippidae). A further 13 species of butterflyfish, one pomacanthid and two species of Balistidae are listed in the Second Schedule of the Fisheries Ordinance and can be exported only under licence (Wood and Rajasuriya, 1996).

MALDIVES	<ul style="list-style-type: none"> • Export • Large scale • Export began in 1979 • 12 companies were operating in mid-1990s (Adam, 1995), but only four export companies were operating in 2000 (Zaha, pers. comm. 2000). • Collecting began in North Male Atoll, and this remains the most important collecting area. In the mid 1990s, one company started collections from Addu Atoll, but this stopped because of high operational costs. Currently, there is some collecting from areas close to the regional airports (Zaha, pers. comm. 2000). 	<ul style="list-style-type: none"> • Fish from the Maldives supply a wide market, especially Japan and Europe, but also further afield. Traditionally, much of the catch has been exported to Sri Lanka for subsequent re-export to the global market, but this proportion is gradually declining. For example, in 1997, 50% (by value) of total exports were sent to Sri Lanka for re-export, while in 1999 this had dropped to about 33% (Source: Customs/EPCS, Ministry of Fisheries, Agriculture and Marine Resources). • 42,128 fish were exported in 1980, and exports remained at about 50,000 annually until the early 1990s, when numbers rose. In 1994 and 1996 more than 300,000 fish were exported, valued at about US\$ 480,000 (fob price). In 1999, the number had dropped to 167,000 fish with a value of about US \$ 297,000 (Source: Customs / EPCS, Ministry of Fisheries, Agriculture and Marine Resources). • About 100 species are used, with 20 species comprising over 75% of trade. In 1997, the five most commonly exported fish were four species of anthiid, together with the surgeonfish <i>Acanthurus leucosternon</i> (data from pro-forma invoices, compiled by Marine Research Centre). 	<ul style="list-style-type: none"> • Initially most of the collecting was done by Sri Lankan divers, but locals are now employed. • The company opening operations in new stalls first trains local people from these atolls. The training components include snorkelling, good practices and environmental awareness. • The use of moxy net was banned in 1997 (Zaha, pers. comm. 2000). Circulars have been distributed throughout the country to create awareness among the fish collectors and exporters about the destructive methods of collecting fish. • The companies have to be registered with the Ministry of Trade & Industries. The premises do not have to be licenced, but they have to obtain a license to export marine aquarium fish. • Quotas are issued to the companies by the Ministry of Trade and checks are kept by reference the proforma invoices. In 1999 the number of fish exported were within the set quota (Zaha, pers. comm. 2000) • Collection of aquarium fish is banned from the house reefs of resorts and from marine protected areas. • Collection of coral is not permitted. • Fish are placed into one of three categories. Export is banned in Category A, which includes species that are rare or do not survive well in captivity. These are: marble moray (<i>Uropterygius marmoratus</i>), Meyer's butterflyfish (<i>Chaetodon meyeri</i>), oval butterflyfish (<i>C. trifasciatus</i>), triangular butterflyfish (<i>Chaetodon triangulum</i>); Armitage's angelfish (<i>Apoemichthys armitagei</i>); green damsel (<i>Chromis viridis</i>), bicolor parrot (<i>Cetoscarus bicolor</i>), palette surgeonfish (<i>Paracanthurus hepatus</i>), spotted toby (<i>Canthigaster janthinoptera</i>), Solanders toby (<i>Canthigaster solandri</i>), saddleback pufferfish (<i>Canthigaster valentini</i>) and shortspine porcupine (<i>Diodon liturosus</i>).
SOUTH-EAST ASIA AND AUSTRALIA REGION			
COCOS KEELING	<ul style="list-style-type: none"> • Export • Small scale 	<ul style="list-style-type: none"> • There is a total allowable catch of 2,000 aquarium fish per annum. 	<ul style="list-style-type: none"> • Fishery managed. Quota system in operation.
THAILAND	<ul style="list-style-type: none"> • Export • Large scale • There are probably less than 10 aquarium fish dealers in Phuket and nearby provinces; also a few businesses in several other coastal provinces in 	<ul style="list-style-type: none"> • Data from the Customs House at Phuket airport for 1987-1990 reveals that the export values for marine ornamental fishes were 0.7-1.3 million Baht per year (about 28-52 thousand US \$ per year). No recent export data are available, but according to Singapore government statistics, large numbers of ornamental marine fish are imported from 	<ul style="list-style-type: none"> • Initially, dealers could export without any licence. In 1991, conservation concerns led the Ministry of Commerce to introduce an export regulation (No. 56), which stated that export of ornamental marine fishes could be done only under permit. The regulation covers 400 species of marine fishes. Since then trade has stopped growing, but illegal export still occurs. • There are restrictions on collection and fishing practices for certain areas including 1) fisheries reserve areas (marine sanctuaries), as claimed by

	<p>Thailand, and several major dealers in Bangkok.</p> <ul style="list-style-type: none"> Collectors (mainly local sea gypsy) and dealers claim that they use only gill nets and hand nets, but it is thought that cyanide (although illegal) is used). 	<p>Thailand into Singapore. Numbers in recent years are: 1996: 115,800; 1997: 313,000; 1998: 285,600. Some of these may be used for the Singapore domestic market; others will be re-exported.</p> <p>[All information on Thailand from Satapoomin, pers. comm. 2000]</p>	<p>the Department of Fisheries, 2) marine park areas, as claimed by the Royal Forestry Department, and 3) certain areas called environmental protection areas, claimed under the agreement of the Ministry of Technical Sciences and Environments.</p>
VIETNAM	<ul style="list-style-type: none"> Export Large scale Collecting has increased over the past ten years. There were 26 full-time and 70 part-time collecting families in 1990. This increased to 100 full-time and 200 part-time collecting families in 1999. Apparently demand exceeds supply. The main collecting season is from March to September. Khanh Hoa province is the main coral reef fish and invertebrate collecting area, especially around the islands off Nha Trang. 	<ul style="list-style-type: none"> Fish are sent primarily to Ho Chi Minh City, Hai Phong and Vung Tau. Most (?) are then exported to Hong Kong, Thailand, Taiwan, Singapore and France. Confusingly, imports from Vietnam do not feature in the official trade statistics of either Singapore or Hong Kong. Each collector goes out about twice each week and nets about 200 fish per trip. Thus an estimated 160 000 fishes may be collected from Khanh Hoa province each month, excluding invertebrates. This makes a large annual total, possibly in the region of a million or more fish. <p>(All information on Vietnam from Truong SiKy and Ngo Chi Thien, pers. comm. 2000, unless otherwise indicated).</p>	<ul style="list-style-type: none"> Trade is meant to be governed by local regulations, and also possibly by national law, but there are no specific laws governing trade in coral reef fish and invertebrates. All species listed in the Vietnam Red Data Book are meant to be 'protected', but there is no enforcement and also there is uncertainty about application of regulations (Job, pers. comm. 2000).
TAIWAN	<ul style="list-style-type: none"> Export and domestic use Small scale? Cultured fish are exported (<i>Pomacanthus maculosus</i> and <i>P. azfur</i>). There is also seasonal collection of the blue-stripe angelfish <i>Chaetodontoplus septentrionalis</i> (West, pers. comm. 2000). 	<ul style="list-style-type: none"> There is (or was) some export – for example 89,400 fish were sent to Singapore in 1996, but this fell to zero in 1998 (source: Singapore government statistics). Hong Kong regularly imports from Taiwan, with a peak value of HK\$ 709,077 (cif) in 1988 (Chan and Sadovy, 1999). 	

<p>HONG KONG</p>	<ul style="list-style-type: none"> • Domestic use and export • No collection 	<ul style="list-style-type: none"> • Marine aquarium fish are imported from over 15 countries, ranging from Australia to the Philippines, Thailand and the Yemen Republic (Chan and Sadovy, 1999). • Import value for 1998 was HK\$ 5,023,000 (approximately US\$ 625, 746). • A total of 342 species was recorded as entering the country, with about 60% belonging to the families Labridae, Chaetodontidae, Pomacanthidae and Pomacentridae. A small proportion of the stock is for re-export (e.g. 1.6% by value in 1998), but the majority is for domestic use, with an estimated annual 957,563 fish sold locally based on a survey of marine aquarium shops in 1996-1997 (Chan and Sadovy, 1999). 	
<p>PHILIPPINES</p>	<ul style="list-style-type: none"> • Export • Very large • Exports began in 1957 (Fleras, 1984). • In the early 1990s there were an estimated 2,500 collectors and about 45 aquarium fish exporters (Pajaro, 1993). • Currently, the number of exporters "actively exporting" is 34 to 37 (Baquero, IMA, pers. comm. 2000). • In the early 1980s there were 4 main collecting areas. • By the late 1990s there were at least 8 major collecting areas, with most on the western side (Vallejo, 1997). They include the Luzon Islands, the Visayan group of islands in the center of the archipelago and the Mindanao area. 	<ul style="list-style-type: none"> • For many years, the Philippines was the major supplier of marine fish for the ornamental market (Wood, 1985; Vallejo, 1997). • Exports of marine aquarium fish climbed steadily in the late 1970s and early 1980s (Wood, 1985), but dropped in 1984, with export value under US\$ 500,000 (Philippine Bureau of Fisheries and Aquatic Resources (BFAR) data quoted in Vallejo, 1997). Exports then increased rapidly until 1988 when they peaked at about US\$ 8 million. They then remained fairly stable into the early 1990s. From 1990-1994, export value for marine specimens averaged 6.76 million \$US annually (Vallejo, 1997). • The USA has always been one of the main importers of Philippine fish. In 1975, more than 80% of imports to the USA were from the Philippines (Randall, 1987). In 1994, 50% of exports from the Philippines were destined for the US market (Vallejo, 1997), but there has been a decline in recent years. From 1995 to 1999, exports (fob price; marine and freshwater combined) to the US declined from 5.2 to 2.7 million \$US (US Department of 	<ul style="list-style-type: none"> • Exporters require a permit or licence to operate, but they do not have to follow minimum standards and can set up an exporting facility anywhere. No government agency checks are made on these premises (Baquero, IMA, pers. comm. 2000). • There are no regulations covering the collection of marine fish or invertebrates (other than corals) and no restrictions on the number of collectors who can operate. • Collection of live corals for export or local use is illegal in the Philippines, however some markets still sell live corals for local marine aquarium hobbyists (Baquero, IMA, pers. comm. 2000). • Exporters generally claim that they deal in net caught fish, but this is difficult to verify because under the current system of testing for cyanide, concentrations below 0.2ppm are considered negative (Baquero, IMA, pers. comm. 2000). • A nationwide net training programme began in 1989, with the aim of addressing the cyanide problem. It met with some difficulties and 'back-sliding' of trained collectors (see main text), but efforts continue to try and bring about improvements. • Fishers who follow the net training programme get a Certificate. To become a member of the Federation of Fish Collectors of the Philippines, fish collectors must follow the net training course.

		<p>Commerce Report, 28 May 2000).</p> <ul style="list-style-type: none"> • Many other countries are supplied by the Philippines, including Japan, Hong Kong, Singapore and European Community countries. For example, imports to the EC from the Philippines in 1998 were valued at US\$ 1.7 million (cif value). • According to Barber & Pratt (1997), Philippine government statistics showed that as many as 6 million marine aquarium fish were exported in 1996. • The Philippine fishery uses 386 species of coral reef fish belonging to 79 families (Vallejo, 1997). 	
MALAYSIA	<ul style="list-style-type: none"> • Domestic use • Small scale 	<ul style="list-style-type: none"> • Malaysia used to export marine aquarium specimens, apparently sending most to neighbouring countries for re-export. • Export is no longer permitted. However, Hong Kong imported marine aquarium fish from Malaysia to the value of HK\$ 66,000 in 1998 (Chan and Sadovy, 1999) and Singapore imported 2,700 marine fish in 1997 but none in 1998 (Department of Statistics, Singapore). EC countries also imported from Malaysia at least up until 1998 (Eurostat data). 	<ul style="list-style-type: none"> • Export of marine fish from Malaysia is now prohibited (Hiew, pers. comm. 2000). However, there is some collection for domestic sales. • Harvesting of ornamental species is not permitted in marine protected areas (Peng, pers. comm. 2000).
SINGAPORE	<ul style="list-style-type: none"> • Export • There are no collectors operating in Singapore waters, but Singapore plays a major role in transshipment of marine fish. 	<ul style="list-style-type: none"> • Fish are imported from adjacent countries where collecting takes place (e.g. Philippines, Thailand, Sri Lanka and Taiwan) and also from Hong Kong – another transshipment centre. Exports have declined significantly in the past decade, from 4.3 million fish in 1989 (Wood, 1992) to 1.3 million in 1998 (Department of Statistics, Singapore). 	
INDONESIA	<ul style="list-style-type: none"> • Export • Very large scale • Collection and export of marine ornamental fish was established at least in the early 1970s (Kvaalvagnaes, 1980). • The main ports of export in 	<ul style="list-style-type: none"> • Indonesia is an important supplier of marine aquarium species, having increased its share in the market since the late 1980s. For example, in 1980, 4.3% of imports to the UK came from Indonesia (Wood, 1985), while in 1990 this had increased to about 27% (Wood, 1992). • Official export statistics for 1993 (source: Direktorat Jendral Perikanan, Departemen 	<ul style="list-style-type: none"> • When trade started, exporting companies had to have permits from the Directorate General of Fisheries. This specified the area the company was allowed to collect in or buy fish from, but placed no limits on volume or the species that could be taken (Kvaalvagnaes, 1980). • Permits are issued by local (provincial) government but figures are not in the national statistics (Llewellyn, pers. comm. 2000). • There are now limits on collection of hard corals (Samedi, pers. comm. 2000).

	<p>1993 and relative importance based on % of trade by volume were Jakarta (64.6%), Bali (28.3%), North Sulawesi (3.2%), North Sumatra (2.2%) and Maluku (1.7%) (percentages calculated from figures produced by Directorate Jendral Perikanan, 1994 for trade in marine and freshwater fish).</p>	<p>Pertanian, Jakarta, 1994) give total exports of marine ornamental fish as 2,039 tonnes, valued at US\$5.5 million (fob price).</p> <ul style="list-style-type: none"> • Analysis of figures for destination show that 39% (by volume) of exports (freshwater and marine combined) go to the USA, 41% to the Far East, 18% to Europe and 1.5% to Australia and New Zealand. • The USA is one of the main importers of Indonesian fish. Exports (fob price) from Indonesia to the US of marine fish, invertebrates and freshwater specimens are shown below [source US Department of Commerce Report 28 May 2000] <ul style="list-style-type: none"> 1995----- US\$6,517,000 1996----- US\$7,181,000 1997----- US\$6,518,000 1998----- US\$5,575,000 1999----- US\$4,487,000 • Value(cif) of imports to European Community countries between 1992 to 1998 ranged from US\$ 2.1 to 5.1 million 	<p>Regulations concerning collection of marine ornamental species (other than hard coral) are issued by the Fishery Department. These regulations include the prohibition of using explosive materials and cyanide, but cyanide is still in regular use.</p> <ul style="list-style-type: none"> • No collection is allowed in Marine Conservation (Protected) Areas such as Marine National Parks and Diving Sites. Some Provincial Governments also issue regulations and may prohibit collection of certain marine species (Samedi, pers. comm. 2000). • The use of cyanide to stun fish prior to capture is widespread. There have been efforts to stop the use of cyanide, including law enforcement and training of fishermen, but the result is not satisfying and cyanide fishing remains a big problem for the aquarium fish industry in Indonesia (Pet, pers. comm. 2000).
<p>PAPUA NEW GUINEA</p>	<ul style="list-style-type: none"> • Export • Small scale in the past. • Fish were collected and traded from Rabaul (East New Britain Province) for some years and also from Wewak (East Sepik Province) Kailola (1995). 	<ul style="list-style-type: none"> • There is continuing interest shown in developing the aquarium fish trade, but the main disadvantage for PNG is the logistics in getting the fish to the market especially where collection is expected outside Port Moresby (Lokani, pers. comm 1999). 	<ul style="list-style-type: none"> • The feasibility for establishing a fishery was investigated by Perino (1990). Aquarium fish resources are further discussed by Kailola (1995) who concluded that because of minimal (if any) trade and the abundance of reef fishes in PNG, aquarium fish stocks are probably greatly under-exploited. • The DFMR has recognised the potential value of an export marine aquarium in to PNG, and Kailola (1995) suggests strict management and control measures if the fishery is permitted to go ahead. He stressed the importance of developing a high quality operation. • The National Fisheries Authority is the proper authority to licence fishing for aquarium fish. The Office of Environment would also be involved in the licensing for the aquarium trade especially for species which are endangered or listed under CITES (Lokani, pers. comm 1999). There is currently a moratorium on the live reef fishery in PNG (Munday, pers. comm. 2000, and there is no licenced activity (meanng establishment and fishing) for aquarium fish. If there are any aquarium fish going out from PNG then it must be considered illegal (Lokani, pers. comm, 1999).

<p>AUSTRALIA</p>	<ul style="list-style-type: none"> • Domestic use and export • Large scale • Commercial harvest of aquarium fish began in the 1970s (QFMA, 1999). The number of participants at this time are unknown. • The number of permits for commercial collection peaked at 160 in 1990, and had dropped to 69 in 1995. By 1998 it had fallen to 63 participants. • Each of these operations may use a primary vessel and two tender boats to fish at the same location, and use up to two divers plus the authority holder (QFMA, 1999). Thus a maximum of around 180 commercial collectors may operate in the region. • Most of the collecting is in Queensland waters, with the majority of collectors operating out of Cairns. In 1997, only 11 out of 63 (17%) spent more than 100 days collecting, while 46 (73%) spent less than 50 days. 	<ul style="list-style-type: none"> • About 140,000 fish were collected in 1991, involving 150 species (Kung, pers. comm., 1998). This increased to about 240,000 in 1995, but had declined to 140,000 again in 1997 • There is also a recreational fishery, but the harvest levels for this are unknown (QFMA, 1999). 	<ul style="list-style-type: none"> • Initially trade was largely unregulated, and remained so until 1986, when the Queensland Department of Primary Industries (DPI) became responsible for the fishery's management. The Queensland Fisheries Management Authority took over management of the fishery in 1995. • In 1986, the DPI introduced a legal requirement for all commercial participants to hold a permit (QFMA, 1999). DPI also introduced a quarterly catch record in which the permit holder had to record location of fishing activities, number of assistants, total days fishing, and the number of specimens taken. This provided limited data on catch per unit effort, and in 1998, a more detailed daily logbook was introduced by QFMA, with the aim of providing improved catch-and-effort information on the fishery. This will record the number of days at different locations and enable fish harvest and CPUE to be attributed to specific regions and reef, so assisting in the long-term monitoring of aquarium fish stocks. • The level of effort in the fishery has been controlled through limitations on the number of permits granted. When the number of permits reached 160 in 1990, the DPI decided the number of operators would be based on a 'replacement only' policy. When the Queensland Fisheries Management Authority took over the fishery in 1995, 69 operators remained. By 1998 it had fallen to 63 participants. Each of the 'Authorities to collect' (licences) enables the authority holder and two assistants to collect fish (coral fisheries are licenced separately). • Currently, no training requirements are in place for participants in the coral and aquarium fish fisheries. Holders of commercial fisher licences must obtain a certain amount of experience and attend a course administered by the Queensland Fishing Training Council before obtaining a licence. • Collectors have to apply for a permit each year and pay an annual fee, which contributes to the cost of managing the fishery and carrying out research. Fish may be taken using fishing lines (with a single, barbless hook), cast nets, scoop nets, seine net, barrier net and a herding device (small rod). Regulations are in force regarding dimensions and mesh size of the nets. Commercial collectors are allowed to use SCUBA or hookah gear, but recreational collectors may only use snorkelling gear (QFMA, 1999). Use of chemicals is not permitted. A record of all sales has to be kept by the permit-holder and catch has to be submitted on a quarterly basis • Coral collection is allowed only for domestic use and is restricted to 50 designated sites. Collectors have removed 1-2% of the standing population each year with no noticeable impact noted on resources (QFMA, 1999). • Bag limits for recreational collectors are in place for a number of popular reef species, and it is possible that overall bag limits may be introduced in
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			<p>order to put a ceiling on excessive catches and prevent collection for the black market (QFMA, 1999).</p> <ul style="list-style-type: none"> • The impact of collecting aquarium fish in Queensland has not been investigated specifically by fishery-independent surveys, but the general status of reef fish stocks within the GBRMA, which sustains much of the catch, is monitored by a number of research surveys. No local depeltions have been detected to date (QFMA, 1999). • In July 1999 the Aquarium Fisheries and Coral Fisheries working group of the Queensland Fisheries Management Authority produced a detailed discussion document (QFMA, 1999), which provides the basis for the formulation of fishery management plan. Many of the issues are specific to the fishery in Australia, but the document provides a good model for other countries (Kung, pers. comm.. 2000).
NORTH-WEST PACIFIC			
JAPAN	<ul style="list-style-type: none"> • Mainly domestic use; some export • Medium scale • One of the most important areas for collection is in the Okinawa region. • 104 fishers are approved as collectors of aquarium fish (main island: 53, Miyako: 13, Yaeyama 38) 	<ul style="list-style-type: none"> • Data are not available because it is quite minor as a fishery (Komori, pers. □omm., 2000). Collectors usually engage in ordinary fisheries and catch aquarium fish when they get orders. • Aquariums buy fishes or collect by themselves for exhibition. Each aquarium reports the fishes (species and number) to the Japan Zoo and Aquarium Association which compiles the data <p>[All information on Japan from Komori, pers. comm., 2000).</p>	<ul style="list-style-type: none"> • Aquarium fisheries are controlled by the Okinawa Fisheries Coordination Law. Fishers engaged in aquarium fisheries are subject to governor's approval. No regulation for collection method (ways, mesh size) is indicated in the law., and there is no direction for collecting season, size or quantities that can be taken. Use of poisonous substances (cyanide, detergent, bleach) is prohibited by the Marine Resource Protection Law. • There is no direction for reporting of catches of aquarium fish (i.e.,species and number). They will be a part of "miscellaneous" in catch data
BELAU (PALAU)	<ul style="list-style-type: none"> • Export • Medium scale • Began in 1991 (Graham, 1996). • Single exporter with 5 – 15 collectors (Graham, 1996) 	<ul style="list-style-type: none"> • Annual exports of around 100,000 fish (Graham, 1996). 	<ul style="list-style-type: none"> • Following public concern about the potentially negative impacts of the aquarium fishery, collection is now strictly regulated by the Ministry of Resources and Development. Operations of the marine aquarium fishery come under the "Marine Protection Act of 1994", specifically the "Regulations on the Collection of Marine Resources for Aquaria and Research" which became effective in December 1994. This provision lays down management objectives for a sustainable aquarium industry, requires collectors and exporters to have permits and report catches and exports, limits the number of collecting permits (thereby limiting fishing effort) and defines the type of gear that can be used (Graham, 1996). Collection of hard corals is not permitted.

<p>GUAM</p>	<ul style="list-style-type: none"> • Export • Small scale • There are currently two commercial companies that share a single holding facility, but have separate shipping operations. • Collecting takes place all around Guam, but the bulk occurs around the northern end of the island. <p>[All information from Tibbatts, pers. comm. 2000]</p>	<ul style="list-style-type: none"> • All of the fish are exported to US markets, either Hawaii or California. • An estimated 250 boxes of fish/year are exported. On average there are 20-25 fish per box, so approximately 5000-7500 fish/year are being exported. • The most popular exports are: 1) Flame Hawkfish (<i>Neocirrhites armatus</i>) 2) Rusty Angel (<i>Centropyge shepardi</i>; endemic to the southern Mariana islands and southern Japan 3) Peacock Wrasse (<i>Cirrhilabrus</i> spp., especially <i>C. katherinae</i>); 4) Spotted Puffer (<i>Canthigaster solandri</i>) 5) Picasso Trigger (<i>Rhinocanthus aculeatus</i>); 6) Lime Green Wrasse (<i>Thalassoma lutescens</i>); 7) butterflyfishes (<i>Chaetodon</i> spp., especially <i>C. mertensii</i> and <i>C. lunula</i>). These species make up an estimated 60-70% of the individuals exported 	<ul style="list-style-type: none"> • Commercial collectors have to have a commercial collecting permit issued from the Department of Agriculture. The permit must be renewed every six months. There is currently no licensing requirement for the holding facility. (Tibbatts, pers. comm. 2000).
<p>MARSHALL ISLANDS</p>	<ul style="list-style-type: none"> • Export • Established fishery, exporting mainly via Hawaii to the USA (Thomson & West, pers. comm. 2000). 		
<p>KIRIBATI</p>	<ul style="list-style-type: none"> • Export • Small scale? • Reported by Pyle (1993) to export aquarium fish 		
<p>CHRISTMAS ISLAND</p>	<ul style="list-style-type: none"> • Export • Catch includes Pacific flame angel <i>Centropyge loriculus</i> (West, pers. comm. 2000). 	<ul style="list-style-type: none"> • Most of the catch is probably sent to Hawaii. 	
<p>HAWAII</p>	<ul style="list-style-type: none"> • Export • Large • Commercial collection of fish and invertebrates for the marine trade was established in 1953, and permits issued for the use of fine mesh nets (Walsh, 1999). • From 1969-1972 there was 	<ul style="list-style-type: none"> • In the latter part of the 1990s, reported value of all marine animals collected for marine aquariums ranged between US\$800-\$900 thousand annually (Miyasaka, 1997; Clark and Gulko, 1999). • A total of 103 fish species were collected in 1995, but over 90% of the harvest was focussed on seven species, in decreasing order of importance: yellow tang (<i>Zebrasoma</i> 	<ul style="list-style-type: none"> • State law requires both commercial and non-commercial collectors to have an aquarium fish catch permit from the Department of Land and Natural Resources (DLNR) Division of Aquatic Resources (DAR), but currently DINR/DAR does not have the authority to limit the number of permits (Clark and Gulko, 1999). • DNLR/DAR is currently working to change the permit regulations, for example in relation to net and trap size, inspections and increased fees (Clark and Gulko, 1999). Several lines of evidence suggest that the current system of reporting is underestimating the harvest, perhaps by a

	<p>an approximately 12-fold increase in the number of permits issued (Walsh, 1999). Commercial permits increased by 39% between 1995 and 1998, from 167 to 274 (Clark and Gulko, 1999).</p>	<p><i>flavescens</i> Kole (<i>Ctenochaetus strigosus</i>), Achilles tang (<i>Acanthurus achilles</i>), orangespine unicornfish (<i>Naso literatus</i>), longnose butterflyfish (<i>Forcipiger flavissimus</i>) and moorish idols (<i>Zanclus cornutus</i>).</p>	<p>large margin (Tissot and Hallacher, 1999).</p> <ul style="list-style-type: none"> • There have been a number of conflicts between dive-tour operators and aquarium fish collectors, and these intensified in recent years when growth of the aquarium trade increased the areas where collecting occurred (Clark and Gulko, 1999). DLNR/DAR set up a working group in 1996 to address the problem, and in 1998 the State Legislature passed Act 306 that required the establishment of the 'West Hawaii Regional Fishery Management Area'. A further requirement was for the designation of a minimum of 30% of the West Hawaii coastal waters as Fish Replenishment Areas (FRAs) in which aquarium fish collection is prohibited (Clark and Gulko, 1999). • DLNR/DAR funded a study in which populations of fish species of high importance to the aquarium trade were studied at collecting sites and compared with populations at protected sites. The results of the study indicated that aquarium collectors were having significant impacts on eight of the ten species examined. However, in order to assess whether these abundance patterns are clearly due to aquarium fish collecting requires better knowledge about the intensity and location of collecting activities (Tissot and Hallacher, 1999).
SOUTHERN PACIFIC			
SOLOMON ISLANDS	<ul style="list-style-type: none"> • Export • Small scale? • One exporter to Los Angeles (West pers. comm. 2000). 		
NEW CALEDONIA	<ul style="list-style-type: none"> • Export • Small scale? • Restarted recently after a lapse of about 10 years (West, pers. comm. 2000). 		
VANUATU	<ul style="list-style-type: none"> • Export • Small scale? • Two to three exporters, mainly to Australia (West, pers. comm. 2000). 		

FIJI	<ul style="list-style-type: none"> • Export • Large scale • A single company began collecting in 1976, but production gradually declined until operations ceased in 1982 (Lewis, 1985). • A new company began operations in 1984), and there are currently five export companies dealing in fish, live coral and live rock (Lovell, 2000), employing 10 full time and 20 part-time collectors (Dufour, 1997). 	<ul style="list-style-type: none"> • About 40,000 fish were exported in 1985 (Lewis, 1985). Currently, approximately 50 to 100,000 fish are exported annually (Dufour, 1997), and there is a substantial trade in live corals (Lovell, 2000). 	<ul style="list-style-type: none"> • Although it was considered to be self-regulating (Lewis, 1985), strict guidelines were introduced in the early 1980s. The fishery is regulated by the Fisheries Division of the Ministry of Primary Industries. Export quotas are applied for each company and a list of species is required with each shipment exported (Dufour, 1997).
TONGA	<ul style="list-style-type: none"> • Export • Small scale • Single exporter. 		<ul style="list-style-type: none"> • Tonga has reduced its aquarium trade suppliers to one, and the only reason he is allowed to operate is because his few collectors use non-destructive stick and net methods catching non-juveniles. Holding facilities and transport methods are sophisticated and regularly checked and regulated by Australian/New Zealand conservation officers on behalf of the local government (Murray, pers. comm. 1996).
AMERICAN SAMOA	<ul style="list-style-type: none"> • Export • Small scale? • One company is currently exporting aquarium fish and invertebrates (Curren, pers. comm. 2000) 	<ul style="list-style-type: none"> • Exports go mainly to the USA (West and Thomson, pers. comm. 2000). 	<ul style="list-style-type: none"> • Permits are required for aquarium fishing. • Collecting occurred in the 1980's, but several applications to collect were denied during 1989-1995 (Craig, pers. comm. 1999). This was because the reefs needed to recover from hurricane damage in 1990 and 1991.
COOK ISLANDS	<ul style="list-style-type: none"> • Export • Medium scale • Fishery began in 1988 and is based on Raratonga. • There are 6 full time and 3 part time collectors • Single export company 	<ul style="list-style-type: none"> • 10,000 fish were exported in 1989, rising to over 20,000 in 1994 • 35 species are involved, but only 8 species are in regular demand. The flame angel, <i>Centropyge loriculus</i>, and red hawk, <i>Neocirrhites armatus</i>, form 35 and 29% of the total catch respectively. [All information is from Bertram, 1996] 	<ul style="list-style-type: none"> • There is monitoring of collectors to try and prevent habitat damage. • Catch and effort are monitored. • There have been no regulations to limit catch or effort because no distinct in catch rate has been detected (Bertram, 1996). • Expatriate fish collectors are not allowed to fish in the lagoon, but there are no regulations covering local Cook islanders. • Management strategies will continue to be developed, particularly to minimise conflict between different user groups, avoid over-fishing and maintain economic benefits to the country (Bertram, 1996).
COSTA RICA	<ul style="list-style-type: none"> • Export • Medium scale? • In the early 1990s there were 40 authorised divers 	<ul style="list-style-type: none"> • Exports go mainly to the USA (West and Thomson, pers. comm. 2000), with some to Europe. • European Community countries imported 	

	<p>(Aguilar, 1992).</p> <ul style="list-style-type: none"> Collecting occurs off the Pacific coast (Thomson and West, pers. comm. 2000). 	<p>stock worth between US\$ 0-44,000 annually (cif value) from 1992-1998 (Eurostat data).</p> <ul style="list-style-type: none"> In the early 1990s exports were reported to be around 143,000 fish annually. This involved 43 spp, with 8 spp taking 81% of trade (Aguilar, 1992). 	
CLIPPERTON ISLAND (FRANCE)	<ul style="list-style-type: none"> Export Small scale? 	<ul style="list-style-type: none"> The endemic angelfish <i>Holacanthus limbaughii</i> is collected around Clipperton Island where it is reported to be an abundant species (Thomson and West 2000). 	

Key to size designation

Small: up to 50,000 fish exported or export value less than US\$100,000 annually

Medium: 50,000 – 100,000 fish exported or export value up to about US\$150,000

Large: 100,000 – 200,000 fish exported, or export value up to about US\$300,000

Very large 200,000 +

Sources of information

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