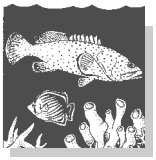

Marketing and monitoring live reef fishes in Hong Kong, an update

by Yvonne Sadovy [1]

The key role of Hong Kong as the major importer in the live reef fish trade (LRFT) was first recognised by Johannes and Riepen (1995). Hong Kong accounts for about 60 per cent of the annual regional trade of about 25 000 tonnes (Johannes & Riepen, 1995). Live reef fish is, economically, Hong Kong's major seafood commodity. To put this into perspective, a conservative estimate of the total value of imported live fish is about US$ 300 million (using an average wholesale price of US$ 20/kg based on Sham 1997 and Johannes & Riepen, 1995) which exceeds Hong Kong's total annual seafood production of its entire traditional capture fleet for chilled fishes (US$ 278 million—1995 figures) (Lee & Sadovy, in press). As an update on the marketing and monitoring of live reef fish in Hong Kong, I present the results of a preliminary survey of the species commonly marketed, their sizes and retail turnover rates and discuss the current monitoring system and concerns with this trade.

The survey was conducted from December 1995 through February 1996 at one of the two principal live food fish markets in Hong Kong, Lei Yue Mun, where about 40 shops operate. During each survey month, three randomly selected shops were sampled every morning and afternoon for one week. For each shop visit, counts were made of the total number and species composition of all fishes present and size estimates made of the more common species (Lee & Sadovy, in press).

Over 60 species were observed on at least 10 occasions each (Table 1—both common and scientific names are provided—see next page). The eleven most commonly noted species are given in Table 2 (see page 49), in order of decreasing abundance, with size ranges and modal sizes provided. Species were dominated by the snappers (Lutjanidae), *Lutjanus* spp., and groupers (Serranidae), mostly *Plectropomus* spp. and *Epinephelus* spp. Although not common, the giant grouper is included because it is highly valued in the trade. Groupers were the most abundant fishes noted, in terms of both numbers of species and of individuals, making up 64 per cent of all fishes counted. A follow-up visit to the same market in April 1997 produced a very similar species list, and recent interviews with about 50% of major traders indicated that, by weight, 60% of imports were coral trout, 20% *Epinephelus* species, 4% giant grouper, 2% Maori wrasse (Napoleon, humphead), 2% highfin (rat, mouse) grouper, with the remainder classed as miscellaneous (Sham, 1997; Louise Li, pers. comm.).

Not surprisingly, groupers figure among the most valuable species, although the Maori wrasse fetches one of the highest prices per kg. In 1997 mean retail prices (US$/kg) ranged from over $ 100 for highfin grouper and Maori wrasse down through the coral trouts, to $ 20–30 for *Epinephelus* sp. grouper (see also Johannes & Riepen, 1995). Very large individuals of a number of species sold at lower prices per kilogram than smaller conspecifics because they usually had to be sold after being divided into pieces.

Modal sizes of the eleven most common species were 35–40 cm in total length. Using estimates of the size of sexual maturation for these fishes (Heemstra & Randall, 1993; Sadovy, 1996, unpubl. data), it is clear that the larger species are mainly sold within their juvenile size range, particularly Maori wrasse and the tiger and Malabar groupers. This was exclusively the case for the giant grouper.

Using length–weight conversions, the fish in Table 2 largely fall within the weight range of approximately 0.5–2.0 kg spanning the sizes preferred by consumers (i.e. 0.6–1.5 kg), as noted by Johannes and Riepen (1995). The giant grouper, long considered a special fish, was an exception: individuals spanned 45 to 90 cm and, although not common (only 22 were seen during the survey), they were present in almost every shop, often for extended periods. This is partly because they confer good luck (for example, they are occasionally

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Table 1: **Species noted in Hong Kong's retail outlets on at least 10 separate occasions. Species also included in mariculture grow-out and which are potentially ciguatoxic are indicated by * (e.g. Lewis, 1986 and Hong Kong Department of Health)**

Family	Species	English common name
Carangidae	*Trachinotus* spp.	Pompano
Centropomidae	*Lates calcarifer*	Giant perch, seabass
	Psammoperca waigiensis	Pink-eyed bass
Haemulidae	*Plectorhynchus cinctus*	Sweetlips
Labridae	*Cheilinus undulatus*	Humphead, Maori, Napoleon wrasse
	Choerodon anchorago	Blunt-headed parrotfish
	Choerodon azurio	
	Choerodon schoenleini	Green wrasse
Lethrinidae	*Gynmocranius griseus*	White seabream
Lutjanidae	*Lutjanus argentimaculatus**	Mangrove red snapper
	*Lutjanus bohar**	Two-spot red snapper
	Lutjanus johnii	John's snapper
	Lutjanus russelli	Bubble lip snapper
	Lutjanus sebae	Emperor red snapper
	Lutjanus stellatus	Star snapper
	*Symphorus nematophorus**	Chinamanfish
Scatophagidae	*Scatophagus argus*	Scat
Scaridae	*Scarus forsteni*	Toothed wrasse
	Scarus ghobban	Bluebarred parrotfish
Scorpaenidae	*Synanceia verrucosa*	Stonefish
Serranidae	*Aethaloperca rogaa*	Redmouthgrouper
	Anyperodon leucogrammicus	Slender grouper
	*Cephalopholis argus**	Peacock hind
	Cephalopholis sonnerati	Tomato hind
	Cromileptes altivelis	Humpback, rat, mouse, highfin grouper
	Epinephelus akaara	Hong Kong, red grouper
	Epinephelus areolatus	Areolate, dotted grouper
	Epinephelus awoara	Yellow grouper
	Epinephelus bleekeri	Duskytail grouper
	Epinephelus caeruleopunctatus	Whitespotted grouper
	Epinephelus coioides	Orange-spotted, green grouper
	Epinephelus cyanopodus	Speckled blue grouper
	*Epinephelus fuscoguttatus**	Brown-marbled, tiger grouper
	Epinephelus howlandi	Blacksaddle grouper
	*Epinephelus lanceolatus**	Giant grouper
	Epinephelus maculatus	Highfin grouper
	Epinephelus malabaricus	Malabar grouper
	*Epinephelus merra**	Honeycombgrouper
	Epinephelus polylepis	Smallscaled grouper
	*Epinephelus polyphekadion**	Camouflage flowery grouper, cod
	*Epinephelus tauvina**	Greasy grouper, estuary cod
	Epinephelus tukula	Potato grouper
	Plectropomus areolatus	Squaretail, spotted coral grouper, trout
	*Plectropomus laevis**	Blacksaddled coral grouper, trout (dark form)
	*Plectropomus laevis**	Blacksaddled coral grouper, trout (pale black saddle form)
	*Plectropomus leopardus**	Leopard coral grouper, trout
	Plectropomus maculatus	Spotted coral grouper, trout
	Plectropomus oligacanthus	Highfin coral grouper, trout
	*Plectropomus pessuliferus**	Roving coral grouper, trout
	*Variola louti **	Yellow-edged lyretail
Sparidae	*Sparus latus*	Yellow seabream
	Mylio macrocephalus	Black seabream
	Rhabdosargus sarba	Gold-lined seabream

* Indicates potentially ciguatoxic fish.

Table 2: **The ten most frequently recorded species with minimum and maximum size classes recorded (5 cm size classes used for total length), in cm, the modal (most common) size, the sample size used and the approximate size of sexual maturation (see text). NA – data not available.**

Species	Minimum size	Maximum size	Mode	Number of specimens sampled	Size at sexual maturity
Epinephelus coioides	25	80	40–45	478	25–30
Epinephelus bleekeri	10	50	30–35	356	30–35
Lutjanus argentimaculatus	25	70	35–40	287	NA
Epinephelus polyphekadion	15	95	35–40	276	30–35
Epinephelus fuscoguttatus	15	90	35–40	258	40–45
Plectropomus areolatus	25	65	35–40	219	35–40
Plectropomus leopardus	10	75	35–40	196	30–35
Epinephelus malabaricus	35	85	40–45	150	45–50
Plectropomus maculatus	20	60	35–40	147	30–35
Cheilinus undulatus	20	100	35–40	143	60–65
Trachinotus blochii	15	90	35–40	113	NA
Epinephelus lanceolatus	45	90	55–60	22	105–110

sold alive to Buddhist groups who return them to the wild for spiritual purposes), possess medicinal value, and are reportedly used as a indicator of tank water quality (Lee & Sadovy, in press). They are also highly valued; current (1997) retail prices range up to US$ 100/kg (depending on fish size). In 1996, several particularly large giant grouper were sold for about US$ 10 000 each (*South China Morning Post*, 14-4-1996).

Turnover rates were high. Over the three-month survey period, an average of 22 per cent of the fish brought into a shop on any one day was sold on the same day, with 85 per cent sold within 6 days (Lee & Sadovy, in press).

Table 3: **Harmonised codes for live food fish from the Hong Kong Department of Census & Statistics as of 01/01/97**

Code	Description
0301 1010	Live freshwater ornamental fish
0301 1020	Live marine ornamental fish
0301 9912	Fish fry, marine
0301 9921	Giant grouper (*Epinephelus lanceolatus*)
0301 9922	Highfin grouper (*Cromileptes altivelis*)
0301 9923	Spotted grouper/coral trout (*Plectropomus* spp.)
0301 9929	Other groupers
0301 9931	Humphead wrasse (*Cheilinus undulatus*) (Maori, Napoleon)
0301 9939	Other wrasse & parrotfish
0301 9941	Snooks & basses
0301 9999	Other marine fish

The government of Hong Kong collects import statistics on live reef fish through the Census and Statistics Department (CSD) using the internationally applied Harmonised Code System. From 1 January 1997, following an initiative by the Agriculture and Fisheries Department (AFD), the existing codes were elaborated to distinguish key species, or species groups, in the LRFT (Table 3). This is a major advance over the earlier system, and is potentially valuable in providing further details of trade imports (Sham, 1997; Sadovy, in press). It is hoped that other nations will adopt the

revised harmonised codes of Hong Kong to enable a regional database to develop for this trade.

Problems remain, however, with Hong Kong's monitoring system. Under current laws, CSD collects statistics from live fish imports entering by air, and by sea on foreign (i.e. not registered in Hong Kong) vessels. Those vessels registered in Hong Kong, on the other hand, are exempt from declaring their cargo partly because of their misclassification as fishing vessels, despite their obvious function as cargo vessels, and partly because live fish are exempt from declaration: in fact live fish are not even considered to be food under current Hong Kong legislation! This means that the import data are seriously incomplete for live food fish because an unknown volume and species composition of live fishes enters on the one hundred-or-so Hong Kong–registered vessels. Although these vessels are informally monitored by AFD, the data do not include details of sources or species composition of imports.

There are several reasons why the LRFT needs to be monitored more effectively, particularly by the major importer, Hong Kong; these relate to three issues of concern: destructive fishing practices; human health and species conservation status.

The use of sodium cyanide to take live fishes began with the capture of certain ornamental fishes in the Philippines, and has now been reported from as far afield as the Maldives, to the west of Hong Kong, and into the Pacific Ocean, possibly as far east as the Solomon Islands and Marshall Islands (Barber & Pratt, 1997). Its use for fishing is prohibited throughout much of the region. Nonetheless, it is evidently widely used with a significant proportion of Hong Kong imports likely taken with cyanide; this inference is based on percentage of fish testing positive for cyanide in the Philippines and on the large numbers of Indonesian fishermen who use cyanide, and that fact that Hong Kong is the major export destination for both countries (Barber & Pratt, 1997; Mark Erdmann, pers. comm.).

Two of the species included in the live reef fish trade for food, the Maori wrasse and the giant grouper, both frequently seen in Hong Kong, were recently classified as 'vulnerable' in the 1996 IUCN Red List because of concerns over their conservation status as a direct result of the LRFT (Hudson & Mace, 1996). Such species are slow-growing, probably long-lived and, hence, particularly vulnerable to overfishing, and cyanide is reportedly used extensively for the Maori wrasse. Trade statistics and biological data are needed for these species to evaluate the volume of trade and the current status of exploited stocks. Current data collection in Hong Kong does not record these species in representative numbers; while both species were evident throughout 1997, very few were reported in official statistics because of shortcomings of the monitoring system.

Imports into Hong Kong come from the Philippines, Indonesia, Thailand, Malaysia, the Maldives, Australia and increasingly from the western Pacific, from the Solomon Islands, the Marshall Islands, Micronesia and possibly Kiribati and Tonga. A recent consequence of the move into the Pacific has been that ciguatoxic fish (fish containing natural fish poisons) have started turning up in Hong Kong [see ciguatera article in this issue, p. 51], because certain areas in the western Pacific, for some unknown reason, produce such fish. A spate of cases in January of 1998 markedly depressed prices, a drop from which the market has yet to recover. To reduce the risk of importing ciguatoxic fish, information is needed on source of fish. Spot checks for ciguatoxins on those species most susceptible (see Table 1) and from known sources of ciguatoxic fishes, could be targeted if such data were available. This would be to the benefit of both consumers and the industry.

Hong Kong continues to consider ways of tackling the shortcomings of its monitoring system. As part of this initiative, Hong Kong recently co-hosted, under the Asia–Pacific Economic Community, a workshop on destructive fishing and is now following up on its recommendations. While there are always concerns by trading nations over the possible negative impacts on free trade of imposing restrictions or obstacles to trade in the form of monitoring or checking of cargo, it is becoming increasingly apparent that responsible trade practices should not be sacrificed solely in the name of free trade (e.g. Code of Conduct for Responsible Fisheries incorporated into the Law of the Sea, 1994) by ignoring health and conservation concerns. Much depends on the commitment and interest of importing countries to play their part in ensuring responsible practices in fishing and trade.

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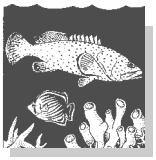

Ciguatera hits Hong Kong live food-fish trade

by Yvonne Sadovy [1]

The demand for live fish for the South East (SE) Asian food market has grown rapidly in the last 10–15 years (Johannes & Riepen, 1995), especially in Hong Kong, Taiwan and China where retail prices for the most favoured species can exceed US$ 100 per kilogram. Originally, most of the fish included in this trade came from the South China Sea but, as demand increased and stocks close to the major importing nations became depleted and could no longer supply the market, fish were increasingly sought from further afield. By the 1990s, live food fish entering Hong Kong, the major importer and accounting for 60 per cent of the trade, came from as far west in the Indian Ocean as the Maldives and as far south and east as the Marshall Islands, Solomon Islands, the Great Barrier Reef of Australia, and adjacent areas (Johannes & Riepen, 1995). So valuable is this trade that market prices can accommodate the long and expensive transportation costs from these more distant locations to Hong Kong where the total annual wholesale value of the live reef fish trade exceeds that of the entire traditional (i.e. chilled fish) capture fishery (Lee & Sadovy, unpubl. ms.)!

The growing trade in live reef fish for food has spawned a number of concerns which relate to both resource use and to issues of human health. Over-harvesting of resources is obvious in some areas, for example, from the fishing of spawning aggregations, the taking of large numbers of juveniles and worrying declines of certain particularly vulnerable species such as the humphead (Maori or Napoleon) wrasse. The use of sodium cyanide to catch fish for this market is also of concern since sodium cyanide is toxic to reefs (Jones, 1997) and reef communities, and may be used to take a significant proportion of fish marketed (e.g. Barber & Pratt, 1997). The consequences for humans of consuming fish caught with sodium cyanide are not known.

What is evident, however, is that there is a growing risk to consuming nations in SE Asia of ciguatera fish poisoning because of the species being marketed, i.e. a number of top reef predators species often implicated as ciguatoxic (e.g., *Cheilinus undulatus, Lutjanus argentimaculatus, L. bohar, Symphorus nematophorus, Cephalopholis argus, Epinephelus fuscoguttatus, E. lanceolatus, E. merra, E. polyphekadion, E. tauvina, Plectropomus laevis, P. leopardus, P. oligacanthus, P. pessuliferus,* and *Variola louti*), and the expansion of the trade into areas known for producing ciguatoxic fish of some of these key desired species. As a consequence, there is a growing likelihood of ciguatoxic fishes being imported into major consuming nations.

Ciguatera fish poisoning is recognised as a serious health problem in the tropics and subtropics (Chan et al., 1992) and is likely to grow with increasing

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