

Smaller size tuna around the Philippines — can fish aggregating devices be blamed?

In recent years, the Philippine tuna production has declined, and fishermen have complained about the increased amount of smaller fish. The authors argue that the use of fish aggregating devices called "payaos" has been at least partially responsible for this.

by J M Floyd and D Pauly

In recent years, several programmes have been conducted to promote the use of fish aggregating devices (FADs) to attract pelagic fish, particularly skipjack and small yellowfin tuna. The tuna industry is rapidly spreading the use of this method throughout the world. Accounts of these programmes have been mainly descriptive and have focused on modes of operation, FAD designs, and technical specifications. In most cases, they have not dealt with the potential impact of FADs on marine resources.

In this article, the authors suggest that, given certain characteristics of fisheries, the use of FADs can contribute to the decline of catches because they remove the built-in safety margin that has, up until now, prevented growth overfishing — a reduction of catch due to early capture of recruits — of most tuna stocks. The Philippine tuna fishery is used as an example.

The Philippine tuna fishery

Over the last decade, the commercial Philippine tuna fishery, employing boats weighing 3 tons or more, has emerged as the largest and most valuable fishery in the country. This occurred because of the introduction of the purse-seine method in combination with FADs. In 1970, tuna production by commercial fishing vessels was 9 054 tons, about 1% of the total marine catch of 892 000 tons. Exports of fresh and frozen tuna in 1970 were 820 tons, worth P 2.5 million (approximately US\$ 0.44 million). By 1980, commercial tuna production was 87 250 tons and represented 7.7% of the total marine catch. The increased production has led to increased exports of fresh and frozen tuna, valued at P 430 million in 1980 (approximately US\$ 57 million). Canned tuna exports have also been substantial, totalling over US\$ 27 million in 1980.

The transformation of the commercial fishing industry to an industrial-scale in-

dustry has its roots in the late 1960s. At that time, a handful of exporters was engaged in buying tuna caught in the Palawan area and Sulu Sea. The fishermen were paid P 0.25/kg (approximately US\$ 0.07/kg). By 1975, exports amounted to P 37 million, with most fish being purchased from small-scale fishermen using small wooden fishing craft known as *bancas*. The growth of the tuna fishery was further fuelled with increased production by small purse-seine and ringnet operators fishing at night and using drifting bamboo rafts for attracting live-bait. Fishing surveys, conducted by the Food and Agricultural Organization of the United Nations' South China Sea Fisheries Development and Coordinating Programme (SCSP) in late 1974, aboard the chartered vessels *Southward Ho* and *Royal Venture*, confirmed that there were substantial tuna resources and that bamboo rafts could be modified and used for commercial operations in Philippine waters. The SCSP survey team estimated the potential catch of seiners, such as the *Southward Ho* or *Royal Venture* (420 GT, 1125 HP and 283 GT, 850 HP, respectively) fishing commercially in Philippine waters for 25 days per month, 10 months a year, would be at least 1 500 tons.

Two Philippine private companies spear-headed tuna purse-seining with FADs shortly afterwards. By 1977, tuna exports were valued at P 85 million, double the 1975 figure. These companies were soon joined by others who responded to the Presidential Decree No. 704, "to keep the fishery resources of the country in optimum productive condition and (to achieve) the maximum utilisation of its fishery resources". At the same time, a Government agency, the Fishery Industry Development Council (FIDC) sought to create a favourable investment climate for joint ventures in the fishing sector "in order to increase

foreign exchange earnings, employment and technology transfer". The proclamation of a 200-mile EEZ by the Philippine Government in June 1978 further intensified interest in the tuna fishery.

In 1981, over 30 Philippine companies were exporting fresh and frozen tuna, operating 79 large purse-seiners and 56 long-liners. Six of these companies were officially recognised joint ventures with local fishing operators, but there were also a dozen more joint-venture enterprises with approved applications not yet in operation and several others with pending applications. These numbers do not include operators fishing without licences and illegal foreign fishermen who were catching tuna at an estimated rate of 50 000 to 100 000 tons each year.

Declining export production

The number of tuna processing companies has grown as rapidly as the number of companies engaged in fishing operations. In 1980, there were nine major operators, and nine other relatively minor operators who exported 607 tons of dried tuna (*katsuobushi*), valued at P 19 million, to the Japanese market. In 1980, there were also 27 fish canneries, 10 of which canned tuna for export. However, tuna export production declined from 41 000 tons in 1980 to 36 000 tons in 1981. This trend has continued into 1982, forcing some companies to close down and many others to slow down operations.

Although tuna catches declined substantially in 1978 from its highest level in 1977, declining export production in recent years has been viewed with more concern. Some experts have attributed this decline to natural fluctuations and to the revised system of catch sampling implemented at that time. More recently, however (1982), declining profitability of tuna operations, resulting from high fuel costs and poor international market conditions, has been cited. This has occur-

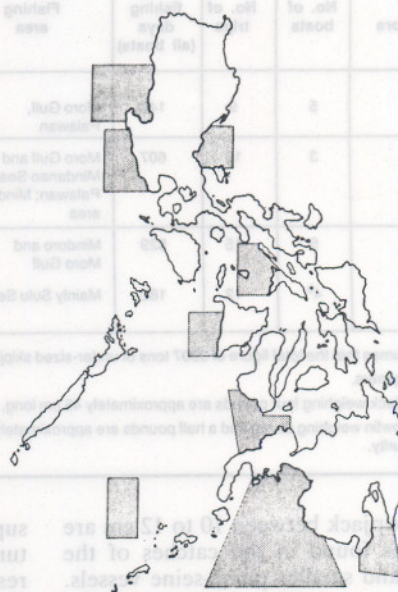
Annual tuna production and export

	Tuna production ^a (MT)			Tuna exports	
	Total ^b	Municipal	Commercial	Quantity (MT)	Value (million pesos)
1970			9 054	820	2.519
1971			8 246	2 770	8.719
1972			9 239	5 161	17.737
1973			22 600	8 545	30.120
1974			25 339	11 376	51.860
1975			21 559	8 120	36.616
1976	124 984	92 124	32 860	5 735	26.812
1977	215 900	155 514	60 386	15 619	85.367
1978	183 999	133 299	50 700	19 771	114.827
1979	197 311	119 017	78 204	33 775	222.723
1980	200 805	113 555	87 250	41 463	430.319
1981	203 754	97 991	105 763	35 850	345.515

^aIncludes yellowfin, skipjack, Eastern little tuna and frigate tuna.

^bPrior to 1976, tuna production was only reported for commercial vessels.

Distribution of the approximately 2000 payaos used for tuna fishing in the Philippines



red at a time when high expectations and optimistic forecasts by both government and fishery industry leaders prompted many producers to expand their fleets. The over-capacity which has resulted is evidenced by the large numbers of tuna vessels for sale or lying idle in various ports throughout the country, by the increasing number of licensing arrangements by Filipino operators with neighbouring countries, and by the recent importation of tuna for processing and re-export.

Major features of Philippine payaos

Three types of *payaos* (approximately the same size) are used in the Philippines: inshore *payaos*, deep-sea *payaos* and steel *payaos*.

In 1981, about 2 000 *payaos* were deployed in several fishing areas around the country. Because of the cost of setting *payaos* and their potential to induce schooling, complicated sharing and rental systems have evolved around their ownership. Rental fees to fish at a sister company's or joint-venture partner's *payaos* may be as high as US\$ 200 000 a year. Commission fees are 10% of the net income for the fish caught at another's *payao* during a particular operation.

Commercial fishing around *payaos* is monitored by small-scale fishermen who, in return, are permitted to handline around the *payao*. These fishermen watch for poachers and make free dives at the *payao* to monitor the amount of schooling.

Introduction of voluntary limits by the Fishing Federation and the Philippine

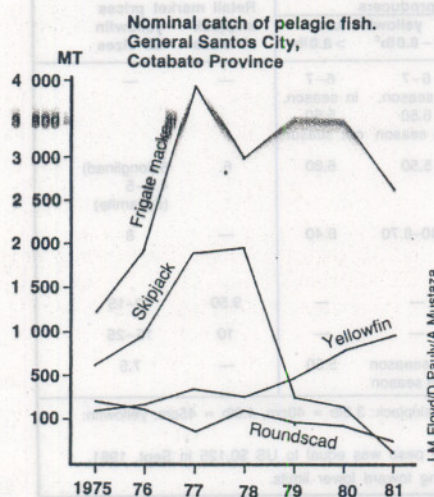
Tuna Producers and Exporters Association, and despite determined policy, poaching and vandalism continue to be a problem.

Catch composition of the Philippine tuna fishery

Available statistics on fish production in the Philippines are generally regarded as unreliable and inadequate for stock assessment, management, and conservation purposes. This is especially true of the commercial tuna fishery because of the highly competitive nature of the industry, the prevailing system of catch declarations, the numerous unloading sites, and the Government's difficulty in monitoring activities. The absence of data on catch per unit of effort and on the size composition of the catch have

also prevented an accurate assessment of the level of tuna exploitation and fishery potential.

One major development is the increasing catch of juvenile fish landed by the commercial ringnet and purse-seine fishery. In General Santos City, for example, about 100 tons of small skipjack, weighing 70-100 g each, were unloaded daily in the 1981 season. Due to their small size, a substantial portion of these fish were misidentified and reported as roundscads (*Decapterus* spp.) or as frigate mackerels (*Auxis* spp.). This may account for the increase in nominal catch of roundscads and frigate mackerel since 1975. The large decrease in tuna production, may be the result of reduced recruitment to the mature stock, as well as the result of reduced catches by the local handline fishery, and probably increased catches by large-scale operators who do not land their fish locally:



Available catch reports from commercial export operators also indicate that the purse-seine tuna fishery in the Philippines is catching a significant quantity of small tunas. Data from four export operators, show that almost two-thirds of their production consisted of under-sized tuna. They are under-sized from a biological viewpoint and also from an economic viewpoint since small tuna do not have the same commercial value as large tuna as they are not suitable for export and processing. The problem, however, is worse than stated. It is claimed that more than 95% of all skipjack landed in the Philippines are less than 30 cm in length, and fish are routinely landed at a length of 14 cm.

Tuna catch and effort by selected commercial operators, 1981 (in MT)

Operators	No. of boats	No. of trips	No. of fishing days (all boats)	Fishing area	Skipjack ^c		Yellowfin ^d	
					<4lb	≥4lb	<7.5lb	≥7.5lb
A	5	9	147	Moro Gulf, Palawan	544	276	178	153
B	3	10	607	Moro Gulf and Mindanao Sea; Palawan; Mindoro area	(2604) ^a	819	(1302) ^a	106
C	5	15	529	Mindoro and Moro Gulf	5279	3559	556	423
D	4 ^b	12	182	Mainly Sulu Sea	—	—	—	67

^aAssumes that the total figure of 3907 tons of under-sized skipjack and yellowfin consisted of 2/3 skipjack.
^bLongliners.
^cSkipjack weighing four pounds are approximately 45 cm long, approximately the length at first maturity.
^dYellowfin weighing seven and a half pounds are approximately 55 cm long, slightly below length at first maturity.

Indeed skipjack between 10 to 12 cm are sometimes found in the catches of the ringnets and smaller purse-seine vessels. The problem is further aggravated by the fact that large numbers of small tuna are not landed but are used as bait for long-lines at the *payaos*.

New markets

As the catch of small tunas has increased, commercial export activities, new markets and new processing industries have also arisen. The incidental catch of small tunas was initially considered a nuisance by the commercial fishery because of the absence of market outlets. But recent interest in drying small tuna for *katsuobushi* for the Japanese market and canning small cooked tuna for the local market has changed this situation. Traditionally, small tuna were not popular as a food fish, but the increased

supply has prompted processing of small tuna into fish paste, which in turn has resulted in increased local consumption, particularly in central Mindanao where the people are poor and where there are few alternatives.

The expansion of local markets for small tuna and the deteriorating international market for large tuna have resulted in relatively uniform prices paid to producers for tuna. The table below illustrates that there is not a premium price for larger fish and that small immature fish often bring the same price as larger fish. What fluctuation there is in price seems to be a function of the province's or locality's capacity to utilise the fish, the distance from transshipment centres, and the presence or absence of commercial buyers. For example, prices are generally low in Cagayan and Southern Negros because there are few buyers. Large

tuna caught by commercial operators in the Sulu Sea are generally landed in Manila. Prices are higher in Zamboanga and Santos because these are the closest urban centres to the major tuna fishing grounds in the Mindanao Sea, and they also have commercial export facilities.

Migration patterns

Reliable data on the patterns of migrations of Philippine tuna are lacking. Based on a vast amount of catch and length-frequency data collected in 1980-1982 at various locations throughout the southern Philippines, however, it has been suggested that skipjack and yellowfin both spawn in the southern Philippines, particularly in the Moro Gulf, and aggregate around the *payaos*. Some fish migrate from Philippine waters, possibly to be recruited to the Indonesian and Papua New Guinea tuna fisheries, and some subsequently return again to the Philippines to be exploited by the *payao* and long-line fisheries. In the light of these migration patterns, a full assessment of the Philippine tuna fishery would have to be part of a larger study that would include catch data from a number of countries in the region.

Preliminary assessment of the situation

While the problems experienced by the Philippine tuna fishery are believed to be not solely due to the catching of under-sized fish, "growth" overfishing seems to explain, at least, part of the problem.

Without getting into a technical resource management discussion, it is possible to say that *payaos* have apparently contributed to growth overfishing in the Philippines because they render small tunas accessible to fisheries which were previously not accessible to them. A ban on catching or landing tuna below a certain size, or on regulating the use and placement of *payaos* could help prevent growth overfishing in areas where very small tuna are available to a *payao* fishery. Viewed in the light of the Philippine experience, and given the general lack of knowledge on the migration, stock definition, and vital parameters of tropical tunas, the introduction of FADs in other countries at this time should be taken only with great caution.

Tuna prices in the Southern Philippines, 1981 ^a (pesos per kg)							
Locality and/or Province	Buyers' price to small-scale producers				Retail market prices		
	skipjack tuna ^b		yellowfin tuna		skipjack	yellowfin	
	Sizes	<3lb	3-4lb	>4lb	7.5-8.0lb ^c	>8.0lb	
Puerto Princesa, Palawan	—	—	3.50	3.50	6-7 in season, 6.50 out season	6-7 in season, 5.50 out season	—
Zamboanga, Zamboanga del Sur	—	—	—	5.50	5.50	6.80	6 (longlined) 4.5-5 (dynamite)
Santos, Cotabato	5.6 (wholesale, by box)	5.6 (wholesale, by box)	5.30	—	8.40-8.70	8.40	8
Davao, Cotabato	—	—	—	5.00	—	—	9.50 12-15
Cagayan	—	—	—	—	—	—	10 15-25
Southern Negros	3.5-4.0	3.5-4.0	3.50	—	5, in season 4, out season	5.50	— 7.5

Note: The following lengths correspond to the weight given: skipjack: 3.0lb = 40cm, 4.0lb = 45cm; yellowfin: 7.5lb = 55cm, 8.0lb = 120cm.
^aLate season prices; 1981 was considered a bad year. One peso was equal to US \$0.125 in Sept. 1981.
^bSmall sizes may include small yellowfin. ^cGenerally tending toward lower limits.

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