High Incidence of Aggregations of the Bigeyes, *Priacanthus tayenus* and *P. macracanthus* in the South China Sea

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Unlike other members of the family Priacanthidae, *Priacanthus tayenus* and *P. macracanthus* sometimes occur in large aggregations in trawl fishing grounds in the South China Sea. Large aggregations of young *P. macracanthus* attracted to light were also encountered in Panay Gulf, Philippines. Positive phototaxis seems to be common in early and young stages of priacanthids, while it is not known if adults of any species of the family also react positively to light.

Caldwell and Bullis (1971) reported an instance of a large aggregation of prejuvenile *Priacanthus arenatus* Cuvier, consisting of an estimated 5000 individuals, attracted to an underwater light in the West Indies. No previous records, according to them, had been known of large aggregations of any priacanthid fish of any age or in any ecological circumstance.

Eight species of priacanthids are known from the South China Sea and adjacent waters (Eggleston, 1974). Among them, *Priacanthus tayenus* Richardson and *P. macracanthus* Cuvier are dominant in trawl fishing grounds of the sea (Senta, 1977), together ranking second place in the catch of demersal fishes (Senta, Tan and Lim, 1977). A large number of *P. tayenus* and/or *P. macracanthus* are often caught in a single trawl haul, suggesting that they somtimes occur in large aggregations. Such instances as well as an observation made on the aggregation of young *P. macracanthus* attracted to the light in Panay Gulf, Philippines are presented in this report.

Catch of Bigeyes by Trawl

The research vessel Changi of the Marine Fisheries Research Department, Southeast Asian Fisheries Development Center, Singapore, had carried out exploratory trawl fishing in the South China Sea since January, 1970. A total of 654 hauls was made in the fishing grounds along the east coast of Malay Peninsula and off the north coast of Borneo during the period from 1970 to 1973 (Anon., 1975; Senta, Tan and Lim, 1977). The trawl net was four-seamed, with head rope length of 36 m, and was towed at an average speed of 3.5 knots. Towing time varied from half an hour to 2 hours according to conditions of catch, bottom topography, and so on. The catch per hour of bigeyes was calculated from the operation and catch records of R/V Changi.

In 29 hauls out of 654, more than 100 kg per hour of bigeyes were caught at the positions illustrated in Fig. 1. These hauls occurred almost in any month. Usually *P. tayenus* accounted for about 90 % in individual number of bigeyes and *P. macracanthus*

10 % in waters off the east coast of Malay Peninsula, while in fishing grounds off the north coast of Borneo the former accounted for about 57 % and the latter 42 % (Senta, 1977).

Three best catches were 366.8 kg per hour (actual catch was 379 kg by 62 minutes towing), 358.0 kg/h (364 kg/61 min.) and 316.9 kg/h (206 kg/39 min.). From the total weight and individual number of bigeyes measured (Senta, 1977), it is observed that the body weight of the fish in trawl catch averaged 125 g. Usually, a number of fishes in the path of the trawl escape over or round the net. Assuming this ratio as 50 % (Tiews, 1969), more than 5000 individuals of bigeyes were in the path of the trawl in each of the above mentioned three catches.

The sweeping area of one hour tow of the trawl was about 0.23 km^2 (36 m × 3.5 knots × 1 hr). If 5000 fish were distributed evenly in the path, the density would be one fish per 64 m^2, and we would conclude that they are either solitary, or at most in loose aggregations. Actually their distribution is extremely contagious as evidenced by the fluctuation in the catch of consecutive hauls operated at the same place (Anon., 1967; Saishu, 1972; Suzuki, 1977a and 1977b). It seems to be more reasonable to interepret that the fish were more or less in large aggregations when more than 100 kg of the fish was caught by a single haul.

Young Bigeyes Attracted to the Light

From the evening of March 6, 1975 to the following morning, the author accompanied Philippine fishermen aboard a fishing boat in Panay Gulf to observe how they operate a basnig, a kind of lift net. The fishing ground was about 7 sea miles off the south coast of Panay Island (Fig. 1), the depth being about 150 m.

The boat was anchored at the fishing ground and six 500-w lamps, two in the water and four in the air, were lit at the bow. After repeating test anglings with line and jigs to ascertain whether fish had gathered under the lamps, the fishermen operated twice that night, once at 23:00 hour and another at 04:00 hour next morning. According to the masterfisherman, they usually operate several times a night, and once they had operated as many as 19 times a night. A rectangular net, 21.6 × 34.2 m, was spread under the boat 40 m below the water surface, and one of the underwater lamps was slowly moved backward, with the others turned off, so that the fish which had gathered would move to above the net.

The first operation yielded 105 kg of fish, which was almost exclusively composed of *P. macracanthus* of about 10 cm in standard length. The catch of the second operation consisted of 280 kg of moonfish, *Mene maculata* (Bloch and Schneider) and 70 kg of *P. macracanthus* of the same size as the first batch. As the body weight of the fish of 10 cm in standard length is about 35 g (Nhon, 1972), the cath of 105 kg and 70 kg fish consisted of about 3000 and 2000 individuals, respectively. This was not an unusual incident for the basnig fishermen.

About 100 *P. macracanthus* were brought back to the laboratory for the study of food items. All the fish had taken planktonic crustacea, especially mysids.

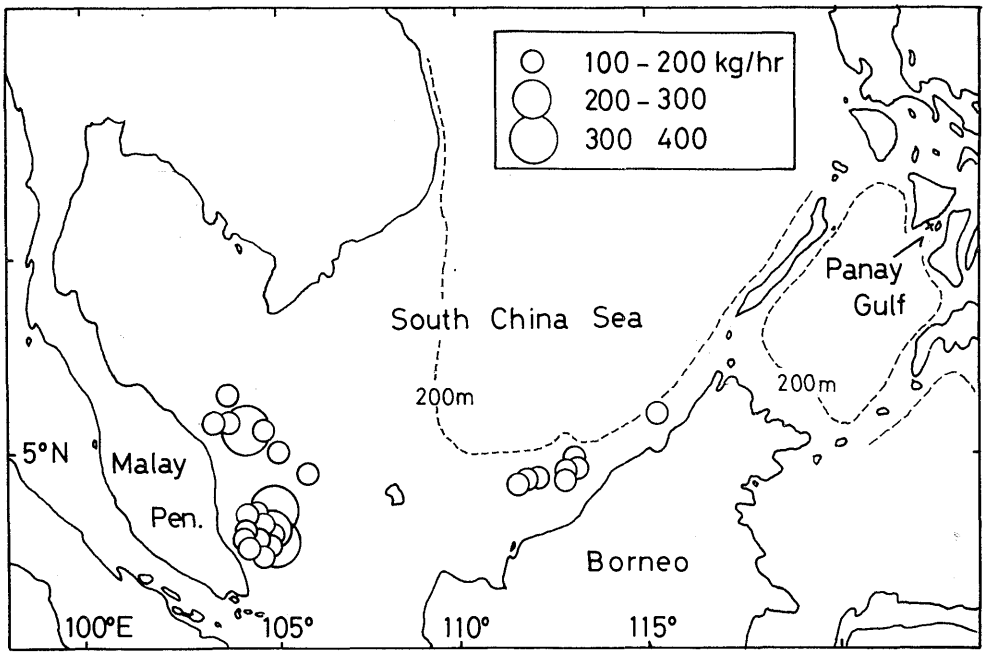

Fig. 1. Chart showing the positions where more than 100kg per hour of bigeyes were caught by a single haul of trawl. The cross in Panay Gulf shows the place where the operation of basning was observed.

Discussion and Conclusion

From the foregoing observations it is evident that the two species of bigeyes, *Priacanthus tayenus* and *P. macracanthus* in the South China Sea sometimes form large aggregations, and in this respect they are peculiar from other members of the family Priacanthidae which are reported to occur either solitary or in small, loose aggregations. This peculiarity can be attibuted, at least to some extent, to the fact that the population density of the above-named two species in the South China Sea is much higher than any other priacanthids inhabiting the South China Sea as well as any other seas. No other priacanthid species are reported to be caught in such large a quantity.

Large aggregations of young *P. macracanthus* attracted to light were encountered in Panay Gulf. They were actively feeding on planktonic crustacea under the lamps. Prejuveniles of *P. arenatus* was reported to crowd an underwater light in the West Indies (Caldwell and Bullis, 1971). Thus it appears that positive phototaxis is common in early and young stages of priacanthid fishes. It is, however, not known if adult fish of any species of bigeyes also react positively to light and float up to the upper layer of the sea in large aggregations.

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イトヒキキントキとキントキダイの集群性

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一般にキントキダイ科魚類の成魚は単独もしくは小さな集群を形成して生活するとされている。南支那海のマレー半島東岸沖およびボルネオ北岸沖のトロール漁場では屢々1時間曳網当り 100Kg以上，時に 300Kgを超えるイトヒキキントキおよびキントキダイが漁獲され，このような場合これらの魚は大きな集群を形成していたと判断される。キントキダイ科魚類の中で上記2種のみに強い集群性がみられるのは，この2種の南支那海における棲息密度が，他の水域および他のキントキダイ科魚類に比べて高いことにもよるのであろう。フィリピンのパナイ湾の水深 約150mの地点で，キントキダイの幼魚が夜間集魚灯について浮上し，2,000～3,000個体よりなる集群を形成するのが観察された。類似の現象が大西洋産の *Priacanthus arenatus* の稚魚でも知られており，正の走光性はキントキダイ科魚類の幼期に共通してみられるのかもしれない。