

SOME PROBLEMS CONCERNING THE CONSERVATION OF THE
DEMERSAL FISH POPULATIONS IN THE EAST CHINA
AND THE YELLOW SEAS

by

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ABSTRACT

An analysis has been made of the demersal fisheries resources of the East China & the Yellow Seas. It is felt that the resources, particularly those of the coastal fisheries, are being over exploited and international measures for conservation of the young fish should be adopted

INTRODUCTION

The present paper will discuss briefly an outline of the present situation of demersal fisheries as well as some problems concerning the conservation of demersal fish populations in the east China Sea and the Yellow Sea. The South-eastern margin of the continental shelf of the East China Sea is bordered by the very deep waters of the Pacific Ocean, and the narrow straits of Tsushima and Korea as well as those off Formosa mark off these waters in the Japan Sea and the South China Sea. As a result of the investigations up to the present, it has been concluded that hardly any of the fish move in and out of the area of the East China Sea, except for such species as the scarlet sea bream (*Erynnis japonicus*) which is distributed over the area from the southern part of the East China Sea to the straits of Formosa. It can be considered, therefore, that the East China and the Yellow Seas constitute a closed water area as far as the fish population is concerned.

From the beginning of this century until the present, the abundant demersal fishes which inhabit the wide continental shelf of the East China Sea and the Yellow Sea, supported the trawling industry in Japan as well as that of other countries surrounding the seas. The landings of demersal species especially those of Japanese and post-war Chinese fishing vessels have been increasing steadily each year; according to a rough estimate, the present annual total has reached 1,600,000 tons.

This annual increase in landings is due primarily to the effort of the fishing industry to increase their catch no matter what the consequences to the fish population. It is apparent that this increase has been sustained by the increase of fishing effort, that is, the number of hauls recorded has continued to grow, and by the continual improvement of fishing gear and equipment. But although the landings have increased, the size of the fish population has been decreasing gradually since 1940. According to our computations, the entire total demersal landings from these seas in 1964 is 1.3 times over that of 1935. This increase in landings is mainly due to the increase in fishing effort by Japanese and mainland Chinese fisherman since World War II. The mainland Chinese have increased their catch from these waters till it has reached 70 per cent of the entire total catch from these seas.

As already mentioned, the size of demersal stock in these waters began to show a sign of decrease from about 1940. As a result of the fishing experience of the nearly 25 years since then, the persons concerned have come to recognize the need for conservation. According to our investigations, it has been made clear that because of the resulting severe exploitation, reducing considerably the productivity of the stock, and the intense fishing of most of the economically important species, except the hair tail (*Trichiurus lepturus*), not only has the level of maximum sustainable yield been surpassed, but also the normal reproduction of the stock has been dangerously interfered with. In order to avoid this undesirable situation, Japan decided that fishing nets with larger mesh must be used. This requirement has been enforced by law since 1964. Thereafter, an international agreement on mesh regulation was reached between Japan and Korea, and Japan and Mainland China in 1965. Although, we are highly hopeful that these regulations will be effective, this is only the first step toward solving the problem. These agreements on mesh regulation described above are valid only for the modern trawlers of more than 50 tons. It is felt that the regulation has to be enlarged to include all kinds of demersal fishing done by those countries.

THE GENERAL SITUATION OF DEMERSAL LANDINGS

The estimated amounts and their proportion of annual total demersals landed by each country recently are shown in Fig.1. The total landings are estimated at 1.6 million tons, of which Mainland China (north from Fukien province, average of 1952-1958) caught 1.1 - 1.2 million tons or 70 per cent of total; Japan (west from 128 30'E., 1965), 320 thousand tons or 20 per cent; South Korea (the Yellow Sea coast and Straits of Korea, 1965), 140 thousand tons or 8.8 per cent. The others (Formosa and North Korea) constitute only a small amount of the total. The greater part of the landings in China and Korea have been carried out by coastal fisheries, e.g., baby trawlers, set-nets

and bottom longliners, and if judged by their fishing procedures and the seasonal variations, they can be considered as "spawning fishery".

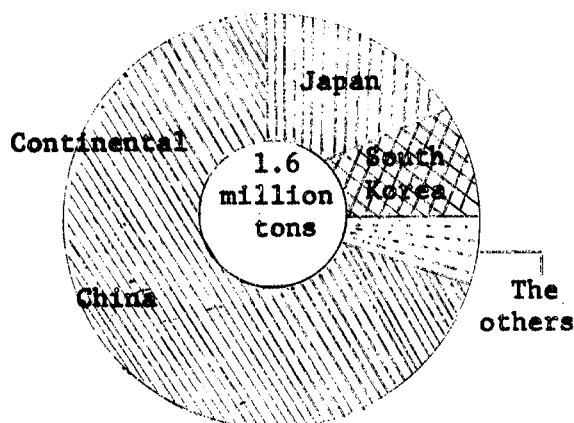


Fig.1, Total demersal landings by each country.

On the other hand, landings by modern vessels (pair trawlers) show less than 30 per cent of the total, and the largest part of that is landed by Japanese trawlers although some of it is done by Chinese and Korean trawlers. As shown in Table I, the proportion of the total landings by each country of the seven economically important species is very similar to that of total demersal landing mentioned above.

Table I

Landing of seven major species by each country

(unit: thousand of tons)

Common name	Scientific name	Japan	South Korea	Mainland China	Total
Hair tail	<i>Trichiurus lepturus</i>	42	30	210	282
Yellow croaker	<i>Pseudosciaena manchurica</i>	75	47	156	278
Chinese herring	<i>Ilisha elongata</i>	17	2	34	53
Conger pike	<i>Muraenesox cinereus</i>	28	2	40	70
Lizardfish	<i>Saurida tumbil</i>			22	
Lizardfish	<i>Saurida elongata</i>	16	*	15	53
White croaker	<i>Argyrosomus argentatus</i>	18	*	*	18
TOTAL		196	81	477	754
PERCENTAGE		26	11	63	100

* a very small proportion.

Although, it is very difficult to determine the long term changes in the total demersal landings country-by-country from these waters, according to a very rough accounting, we can estimate that 1.2 - 1.3 million tons of fish were landed around 1935, which corresponds to 75 - 80 per cent of the present total.

LONG TERM CHANGES IN POPULATION DENSITY WHICH HAVE BEEN CALCULATED BY THE CATCH-EFFORT DATA OF JAPANESE PAIR TRAWLERS

Japan's demersal fishing in these waters had been carried out by the native fishermen using sailing long-liners until the early years of the 20th century, when the modern otter trawler was introduced from England into this country. About 1918, the bull trawl, one kind of pair trawl, was invented and since about 1920 it has been used concurrently with the otter trawl in these seas. Because this new type of net is most effective, this type of fishing developed rapidly and acquired importance so that within three or four years after its appearance, it greatly exceeded otter trawling and long-lining in these waters.

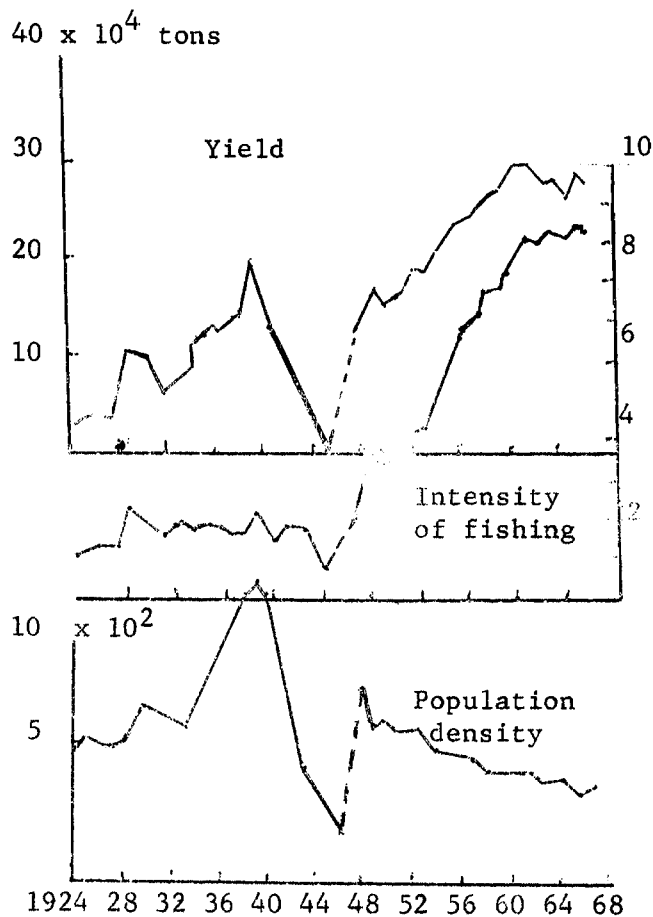


Fig. 2. General statistics for Japanese pair trawl fishery in the East China and the Yellow Seas

Fig.2 shows the long term changes of annual yield, intensity of fishing ^{1/} and population density from those days (1924) and up to the present (1965), as calculated by the data of these pair trawlers. As shown in Fig.2, the annual yield increased rapidly in the early stage and up to 1939, when it reached its pre-war maximum or 250 thousand tons. During the war years of 1941-1945, it decreased markedly, but then the annual yield increased even more steadily up to 1960, when it reached 340 thousand tons which has been the maximum observed in this fishery up to the present. However, since that year, the curve has shown signs of a decrease. We can also notice that the trend of the curve of population density in Fig.2 is somewhat similar to that of annual catch during the pre-war period, that is, the population density increased very greatly year-by-year up to 1939. After careful study of the data, we have concluded that this increase does not mean the growing of the population itself, but it represents increased exploration over wide areas of the continental shelf in the East China Sea and the Yellow Sea with resulting expansion of the fishing grounds in these seas which brought more and more landings to the Japanese fishery. However, this exploration and expansion of fishing grounds by the Japanese trawling fleet came to an end in 1939, and since then, they have concentrated on seeking the abundant species, such as yellow and white croakers, hair tail and lizard-fish in those distant grounds far from their home ports.

On the other hand, the trend of the curve of population density in the post-war period is very different from that of the annual yield. It is clear that except for the war years the population density curve very definitely goes down, rapidly at first, then becomes more gradual, throughout the period from 1939 to 1966. Although, it would be difficult to say that this curve represents exactly the changes of population density itself in these waters, because conditions created by such matters as the restriction of fishing grounds by the Allied Forces, international troubles on the fishing grounds, etc. have more or less affected the changes of the curve, it can be declared that the general trend obviously shows that, "the population density of demersal species in these waters has diminished seriously since 1939."

The fact that the post-war landings increased until 1960, notwithstanding the steady year-by-year decrease in population density has been thought to be due to the continual increase of fishing effort and gear during that time.

The middle curve of Fig.2 showing intensity of fishing indicates the increasing strength of fishing pressure by human beings upon the demersal fish population in these seas. We see that before the war,

^{1/} The intensity curve in Fig.2 does not indicate the real amount of fishing effort or the recorded number of hauls, but it indicates the corrected amount of effort which is modified by the factors of chronological variations on the fishing power of the vessels and gear.

from 1929 to 1942, the intensity curve seems fairly stable at a certain lower level, while after the war it shows a remarkable upward trend. The fishing intensity of the present, according to our computation, is 3.5 times over the level of that in 1929-42. We can, therefore, conclude that the recent fishing pressure has increased considerably.

PROBLEMS CONCERNING THE CONSERVATION OF THE DEMERSAL FISH POPULATIONS

The long term changes in catch, effort and population density which have been shown in Fig. 2 of the previous paragraph does not represent that observed from the overall demersal fisheries in countries surrounding these seas, but represent only that observed from Japanese pair trawling. It has been considered, however, that the overall situation has a tendency considerably similar with that shown in Fig. 2. As mentioned above, around 1935, the entire total demersal catch by all countries is roughly estimated to be about 1,200,000 tons, of which, China holds 800,000 tons or 67 per cent of the total and Japan holds 250,000 tons or 21 per cent. It can be said, therefore, that the share of the landings by the Japanese fishing fleet about 1935 is similar to that at present. The entire total landings by each country at present is about 1.3 times above that around 1935. Therefore, we have to conclude that the recent overall fishing intensity (entire fishing pressure made by each country) on demersal populations in these seas has increased considerably, and its chronological process is more or less similar with that of the middle curve in Fig. 2.

In order to avoid the present decrease in productivity of demersal fishing, result of our biological study indicates that the size of the fish at first capture (minimum size) should be increased. As already cited in this paper, international agreement on mesh regulation on modern offshore trawlers of more than 50 tons was reached between Japan and Korea and Japan and Mainland China in 1965. But for the many kinds of inshore fisheries which are distributed along the very long continental coast, no agreement on fishery regulation has yet been reached among these countries. Judging from the fact that the total yield of this vast amount of coastal fishing reaches more than 70 per cent of the entire total yield, including off shore modern trawlers, and from the fact that the coastal fisheries more or less have the characteristics of "spawning fishery," and have a tendency to over-exploit young fish, it is felt that international measures for the conservation of demersal fish population by the coastal fisheries should be adopted.