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The evolution of the shrimp stock along the Belgian coast in 1969 - 1973

by

R. De Clerck and F. Redant (*)
Fisheries Research Station, Ostend, Belgium

INTRODUCTION

During the period 1966 - 1970 the Belgian landings of commercial shrimps were stabilized at the rather high level of about 1200 tons on the average. In 1971 the landings decreased to 905 tons. 1972 was an even worse year for the shrimp fishery with landings of only 865 tons.

The contribution describes and explains the fluctuations of the landings during the period July 1969 - December 1973. As a matter of fact special attention is paid to the period 1971 - 1972. Besides, the immediate and long-term interactions between shrimp and cod stock are examined.

MATERIAL AND METHODS

The study is based partially on statistical data supplied by the Fisheries Division and partially on results of experimental fishing on cod.

The statistical data include the monthly landings of cod and shrimps from the Belgian coastal waters (statistical rectangle G 1) and the monthly fishing effort of the shrimp fleet. Figure 1 shows the landings of cod during the period July 1969 - December 1973. The monthly yields (catch/hour fishing) of the shrimp fishery during the period July 1968 - December 1973 are illustrated in figure 2.

The experimental part of the study consisted of monthly samplings on five fixed stations in the Westdiep. The positions of the stations are given in figure 3. These samplings were started in May 1970. Experimental

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fishing was always performed with an otter trawl. The mesh size of the net was 18 mm. On each station the catch of a 15 minutes' haul was analysed. Special attention has been paid to the densities of juvenile cod. The densities of 1 year old cod (number/hour fishing) are mentioned in figure 4.

RESULTS AND DISCUSSION

The immigration of the 0-group cod of the 1969 year-class in the Dutch coastal waters during winter 1969 - 1970 caused a decrease of the shrimp landings during summer and early autumn 1970 (Boddeke, 1971). These young cods mainly feed on shrimps of 35 - 45 mm (Boddeke, 1971 and Boddeke and Daan, 1971). The economic consequences of such a predation will only be perceived after a long term, namely in the period that the shrimps of the decimated length-class reach a commercial size and thus become important for the fishery (Boddeke, 1971).

Along the Belgian coast however, the situation during the winter 1969 - 1970 was entirely different. The greatest concentration of the 1969 cod year-class belonging to the Southern Bight population, remained north of Hoek van Holland (Boddeke, 1971). The immigration of these young cods in the Belgian coastal waters was rather small. The yield of the Belgian shrimp fleet during this season remained high and was even better than during the preceding winter (i.e. winter 1968 - 1969) (figure 2). This finding harmonizes perfectly with the Dutch experiences. Because of the absence of a great number of the 0-group cod, the undersized shrimps were spared, resulting in fairly good yields during summer and early autumn 1970 (figure 2).

In October 1970 the immigration of the I-group cod started (figure 4). The cod belonged to the Pas de Calais population as well as to the Southern Bight population (De Clerck, 1973). The majority of them had a length of between 35 and 45 cm (De Clerck, 1973). These fish feed on shrimp less than the younger ones but the shrimps they feed on have a commercial size (Boddeke, 1971). This competition between natural and fishing predation has an immediate effect on the shrimp landings. From November 1970 the yield of the shrimp fishery decreased sharply (figure 2). The mere fact of such a decrease of the yield in winter is absolutely normal but in 1970 it was clearly more abrupt than in the preceding years (figure 2). In April

1971 the yield reached an extreme minimum value of only 4.0 kg/hour fishing. This was much less than during the previous years (figure 2).

In the Dutch coastal area an immigration of the 0-group cod of the 1970 year-class was observed in the same period (winter 1970 - 1971) (Boddeke, 1971). This year-class was less important than the preceding one (Anonymus, 1974 and Boddeke and Daan, 1971) but the simultaneous appearance of both classes (1969 and 1970 year-classes) had a catastrophic effect on the Dutch shrimp stock (Boddeke, 1971). Again the undersized shrimp population along the Belgian coast was spared from an intensive thinning out by the 0-group cod. So landings were normal during summer and early autumn 1971. The yield of the shrimp fishery in October 1971 reached the same level as in September 1970 (figure 2).

During the winter 1971 - 1972 only poor concentrations of the I-group cod (year-class 1970) were observed along the Belgian coast (figure 4). The landings of cod from the coastal waters were much higher than during the previous winter (figure 1), but consisted mainly of 2 years old cod from the strong year-class 1969. These older fishes live in deeper water at the outer edge of the shrimp zone. This was confirmed by the absence of II-group cod in the experimental catches. Moreover, the contribution of shrimps to the food of these cods is negligible (Daan, 1973). So the stock of 2 years old cod had no immediate effect on the shrimp stock.

The yield of the shrimp fishery reached again a very low level during spring 1972 (figure 2). However at that moment no intensive predation on the commercial shrimp stock by 1 year old cod was found. Probably this phenomenon can be explained by a long-term effect of the intensive-predation during the winter 1970 - 1971.

From the growth curves of shrimps (Tiews, 1954 and Redant, 1972) it can be deduced that the commercial shrimp stock (\geq 50 mm) during the period December 1971 - May 1972 mainly consisted of 1 year old females born in winter 1970 - 1971, 2 years old females born in winter 1969 - 1970 and spring 1970 and 2 years old males or secondary females (Redant, 1972) born in winter 1969 - 1970. Taking into account their little change to survive, the contribution of 3 years old shrimps is probably very small. Shrimps born in winter 1970 - 1971 originated from the reproduction period of autumn 1970 (Havinga, 1930 ; Meyer, 1935 and Tiews, 1954). The fraction

of the shrimp population which had to guarantee this reproduction was however largely decimated by the intensive predation by the I-group cod. Consequently the recruitment was very small. So the contribution of females of this poor recruitment to the commercial shrimp stock in winter 1971 - 1972 and spring 1972 was reduced to a large extent. This also explains the low yield of the shrimp fishery during this period.

From June 1972 the yield of the shrimp fleet reached about its former level (figure 2). The 1971 cod year-class was very poor (Anonymus, 1974) so that during winter 1972 - 1973 only small densities of the I-group cod were observed (figure 4). From that moment the situation of the shrimp stock could be considered as normalized.

The record landings of 1615 tons in 1973, which was the highest since 1956, show sufficiently that the shrimp stock recovered completely from the crisis period 1971 - 1972. In 1973 large densities of shrimps were noted along the Belgian coast (De Clerck and Redant, 1974 ; De Clerck, Cloet and Redant, 1973 and 1974). This is probably due to the strong successive brood classes, the absence of juvenile cod and favourable hydrological and climatological conditions.

CONCLUSIONS

In contrast with the Dutch shrimp stock, the population along the Belgian coast has, neither during winter 1969 - 1970 nor during winter 1970 - 1971, suffered from an intensive predation by 0 year old cods of the 1969 and 1970 year-classes.

The abundance of the 1969 cod year-class during winter 1970 - 1971 had an immediate effect on the shrimp landings during this season and a long-term negative influence on the catches during the winter 1971 - 1972 and spring 1972.

The 1970 and 1971 cod year-classes were only observed in small densities during the winter 1971 - 1972 and 1972 - 1973. Their influence on the shrimp stock was limited.

Since the second half of 1972 the shrimp stock seems to have recovered completely from its crisis period.

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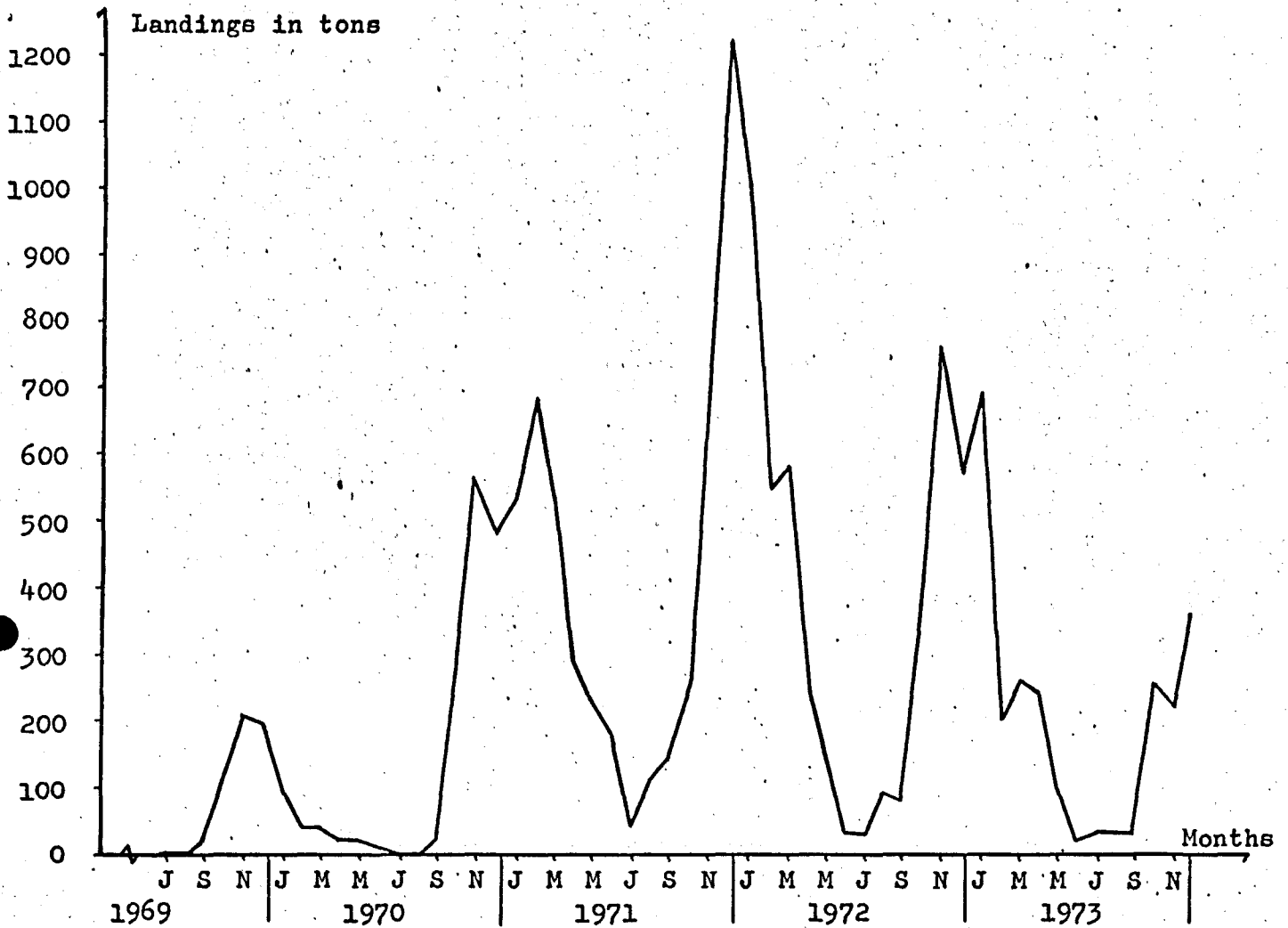


Fig. 1. Monthly landings of cod from the Belgian coastal waters. Period July 1969 - December 1973.

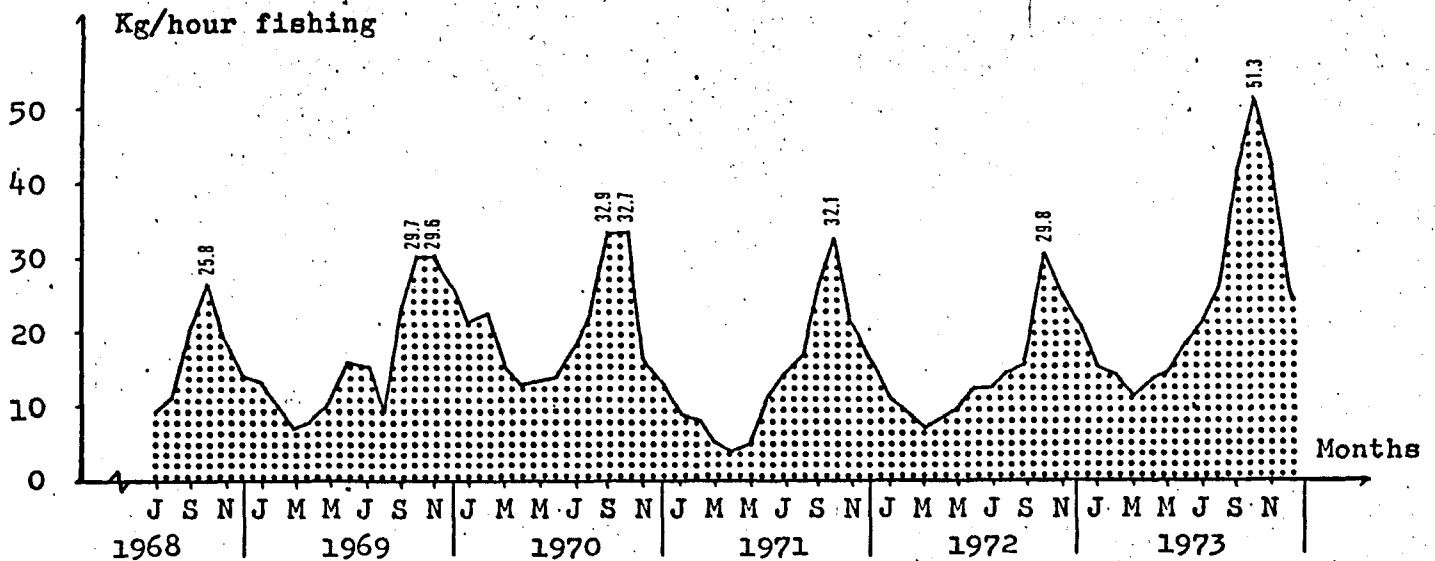


Fig. 2. Monthly yields of the Belgian shrimp fishery. Period July 1968 - December 1973.

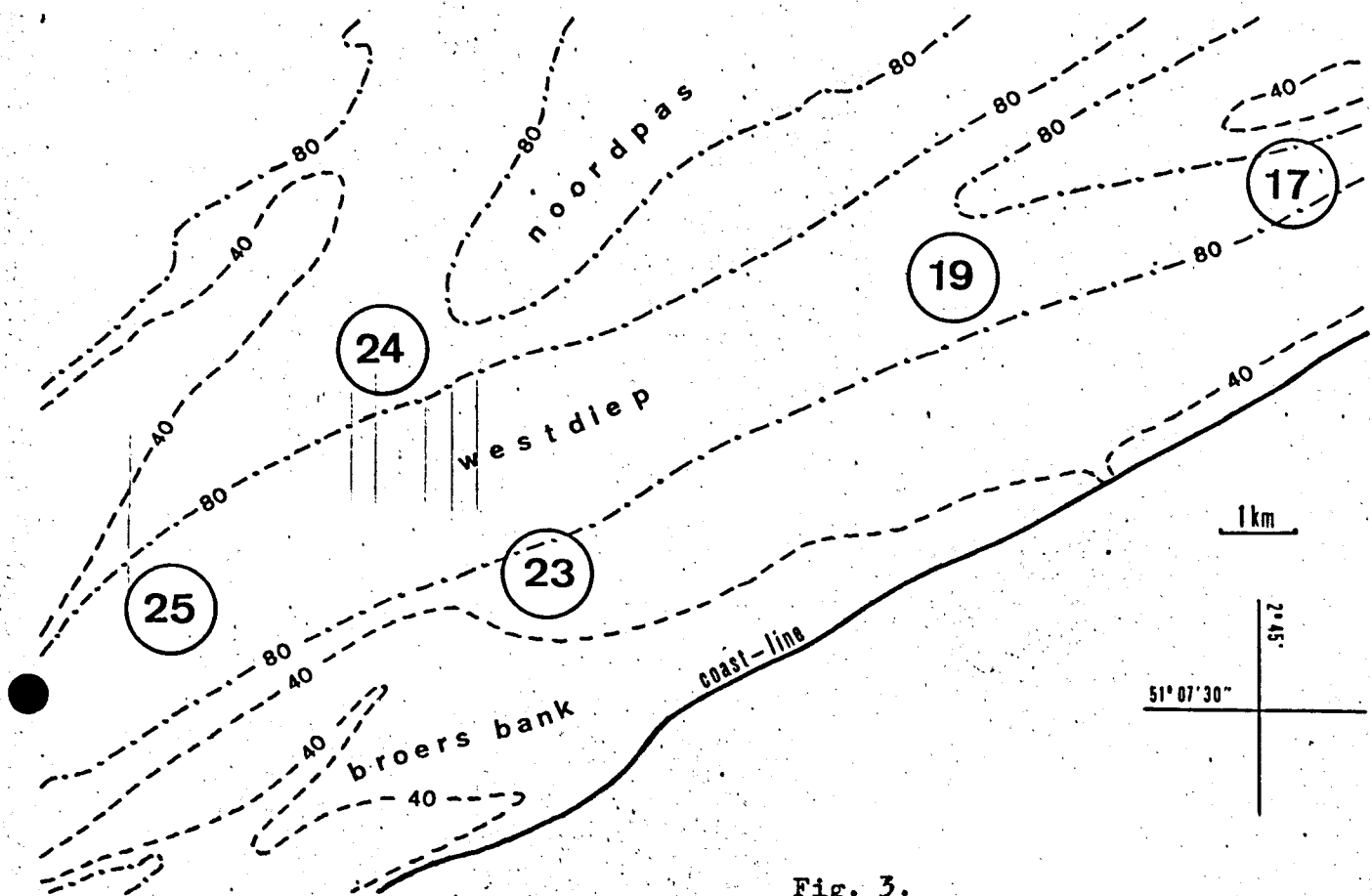


Fig. 3.

Positions of the Westdiep
sampling stations (in circles).
Depths in decimetres.

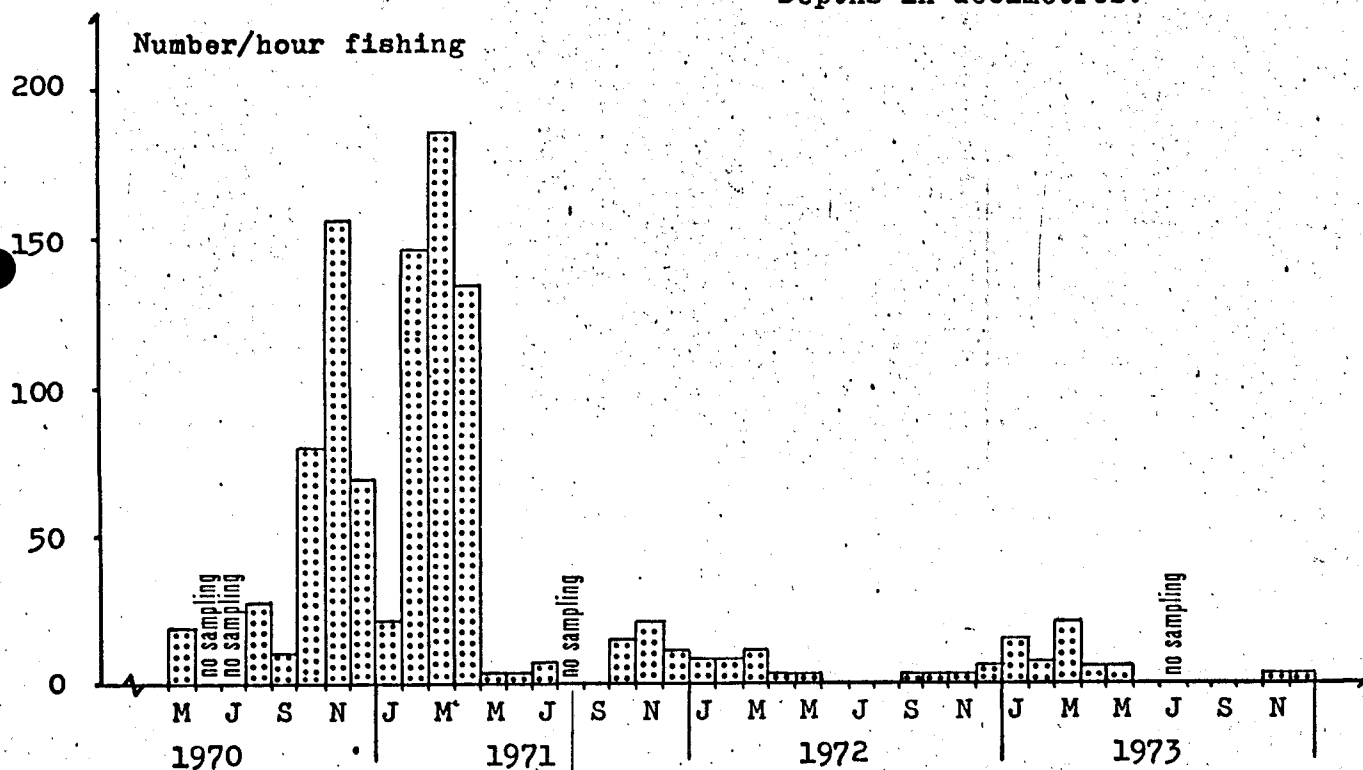


Fig. 4. Densities (number/hour fishing) of juvenile cod on the
fishing ground Westdiep.
Period May 1970 - December 1973.