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Trends in the Witch Flounder Fishery in Divisions 2J, 3K and 3L

by

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Landings

The fishery has been on a decline in regards to annual landings since 1973 (Fig. 1) and in 1978 the landings were the lowest reported in 11 years. Most fish taken from this stock has been by Canadian inshore fishermen using gillnets with Poland and Soviet Union making up the rest by offshore trawlers. The decline in landings by inshore fishermen has dropped dramatically since 1971, with catches dropping to just a few hundred tons in 1978 (Fig. 1). The Canadian otter trawl fleet began to intensify its fishery in 1977 in Division 3K and caught approximately 3,500 tons that year which was a substantially large amount of witch for the Canadian offshore fleet in this area. The catch in 1978, however, dropped off again and the landings for this year were just over 1,000 tons. These reductions in catches from 1977 to 1978 by the Canadian (N) fishermen are probably a result of the increase in catches of cod in the offshore area and the tremendous increase in gillnet Greenland halibut catches inshore making the witch fishery with its low catch rates a little less appealing.

Length and age composition of 1978 commercial catches

Length and age distributions were collected from Canadian (N) commercial trawlers during the first and second quarter of 1978 while fishing in ICNAF Divisions 3K and 3L. These distributions were weighed by calculating the total numbers caught at length and age for each month sampled and adjusting up to the whole stock area for the full year. Since most of the fishery occurs in Division 3K, these samples are probably representative of the total offshore fishery (Fig. 2).

Since the gillnet fishery was not so lucrative during 1978, collection of samples was rather difficult, however, good sampling was carried out during one month (July) in the ICNAF Division 3K area where most of the fishery occurs. These distributions were adjusted to the whole stock area, where gillnet fishing occurred, for the full year (Fig.3).

Length distribution of offshore males for 1978 spanned a range of 28-56 cm in Division 3K with more than 50% in the 36-42 cm range. The Division 3L offshore males ranged from 34-56 cm, however, about 80% ranged from 40-52 cm indicating larger fish in the Division 3L catches (Fig.2). The length range of the offshore females went from 24-64 cm in Division 3K and from 34-64 cm in Division 3L. As in the males, higher proportions of larger fish were taken in Division 3L (Fig.2). While 3L differed from 3K, the 3L sampling was very limited and the catches by number from 3L added little to the total fishery whereas 3K is by far most of the fishery.

The length distribution of the gillnet catches (Fig.3) had a narrower range than the otter trawl catches which is due to the highly selective properties of entangling gear. The males ranged from 36-56 cms with most fish caught in the lower part of the range. The peak of the catch, however, is not all that different than the Division 3K offshore catches. The females from

gillnet catches ranged from 38-68 cm and the highest portion of the catch is in 44-54 cm range (Fig.3). Bowering (1978) reported changes in proportions of larger and smaller fish for this area depending upon which area they are fished and the season. It has been well documented (Bowering 1976, 1977, 1978) that these fish form prespawning concentrations in selected areas of the Northwest Atlantic and these variations in sizes could be the result of the mature versus immature numbers of fish at the a particular season.

Divisions 3K and 3L age distributions were combined for 1978, however, the age composition is essentially on expression of Division 3K (Fig.4). The age composition of the offshore males (Fig.4) ranged from 5-18 years with most of the catch in the 8-12 years old range. The gillnet catches ranged from 8-15 years old with a peak of 10 years old, however, these were high numbers of 9-13 years old fish in the catches. The range difference is obviously the result of selectivity of entangling gear as was previously mentioned.

The age distribution of the inshore and offshore females are markedly different (Fig.4). The offshore females show a practically normal curve from age 5-25 years with no real dominance of any particular year-class. The gillnet catches on the other hand range from 10-19 years with high proportions of 12-16 year old fish and a pronounced peak at age 13 years. While the differences between inshore and offshore catches by different gears are quite different, it must be noted that the amount of witch taken during 1978 by gillnets from this stock area is insignificant in comparison to offshore. Therefore, in regards to exploitation offshore otter trawl for 1978 is by far the most important.

Trends in catches from biomass surveys

Biomass surveys for groundfish have been carried out in ICNAF Division 3L by Canada (N) since 1971 according to the stratified random design. The prime purpose of this type of survey is to determine the abundance of groundfish in an area relative to the previous year of the same survey. Although Division 3L is not the most important fishing area for this stock the results of the 1971-78 surveys are presented here for witch (Fig.5) mainly to indicate any trend in catches over the period. Figure 5 shows the average number of fish caught and average weight (kg) caught per 30-minute tow for the research vessel A.T. Cameron. Variances tend to be high for these surveys depending on the number of stations fished per stratum. In an attempt to reduce the variance, all strata that were fished every year for the whole period were combined for each year and an average number and weight per set were plotted from the total. Beyond this, no other consideration was given to variances for the purpose of this paper.

Except for the 1972 and 1976 averages the numbers were not all that different over the period, however, the averages did represent a slight decline. This generally conforms with the rise and fall in total landings in Figure 1. For all intents and purposes, however, there appears to be no great variation in numbers over the 8 year period.

Similar surveys in ICNAF Divisions 2J and 3K were carried out by the Federal Republic of Germany using a somewhat similar stratification scheme. Results for the Division 2J area for 1972-77 indicated very few witch in the area, at least in November-December when these surveys were conducted and are therefore not presented here. Results for 1972-76 for ICNAF Division 3K area, which is the most productive region for catches of witch are presented in the following table:

Stratum	1972		1973		1975		1976	
	Av. No.	Av. Wt.	Av.No.	Av. Wt.	Av. No.	Av. Wt.	Av. No.	Av. Wt.
61			0.25	0.07				
62	7.75	8.35	3.00	3.30	6.80	5.57	3.00	2.40
63	37.50	19.75	26.50	12.63	38.50	23.00	31.00	20.83
64			27.33	14.50	24.00	10.75	17.00	10.90
65			7.33	9.67	6.33	8.53	7.33	9.91
66	2.33	3.90	2.75	2.52	9.33	9.50	11.40	7.28
67							0.25	0.03

Although no consideration was given to variances in this data, there appears to be little variation in the average numbers or average weights per set over the period of years shown in the table. The numbers shown in stratum 63 particularly when reasonable numbers of fish are caught indicates for practical purposes, a consistency from year to year. Unfortunately, there was no survey in Division 3K during 1974, 1977 and 1978.

Catch and yield per recruit curves

Catch curves were plotted for males and females separately for the 1976-78 commercial otter trawl, since otter trawl catches were considered to be more representative of the population. Total mortality (Z) for the males (Fig.6) is 1.04 and for the females (Z) is 0.55. The correlation coefficients for these regressions are 0.99 for males and 0.95 for females.

The yield curves (Fig.7) were reproduced from Bowering (1978) and are essentially flat-topped with no realistic maximum value of F up to $F = 2.5$. Estimated levels of $F_{0.1}$ gave values of 0.43 for males and 0.27 for females. The average F for the past several years (Fig.6) appears to be somewhat beyond $F_{0.1}$ for males and just a little beyond $F_{0.1}$ for females. These F 's probably reflect an average removal of 10,000 tons annually.

Summary

Although the landings are on a decline, it is probably not as a result of damage done to this fish stock. General trends from the biomass surveys seem to indicate a fairly consistent number of fish from year to year. Considering the age distribution of the commercial catches, up to 20 years for males and up to 25 years for females it is obvious that this stock cannot be over exploited with so many old fish making up the catches. This is also reflected in the catch curves (Fig.6) where fish are not fully recruited until 15-17 years old. This is why the Z values tend to be a little higher than expected. Although the TAC has been 17,000 metric tons since 1975, the TAC has never been taken and is unlikely to be taken again in 1979 with little interest being placed on this stock at the present time.

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1977. An evaluation of the Status of witch flounder in ICNAF divisions 2J, 3K and 3K. ICNAF Res. Doc. 77/VI/10. Ser. No. 5030.
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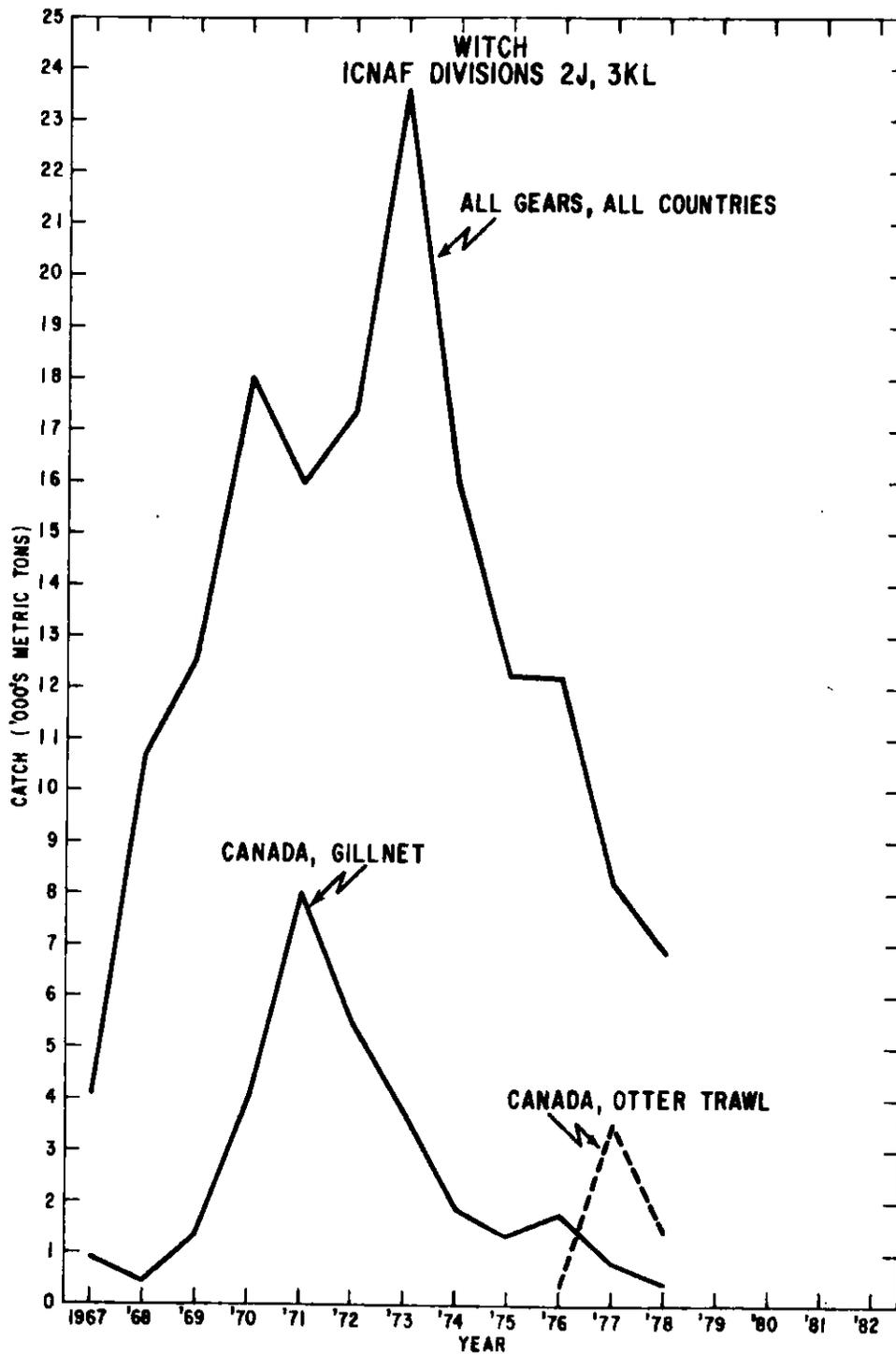


Fig. 1. Total landings of ICNAF Divisions 2J+3KL witch for 1967-78.

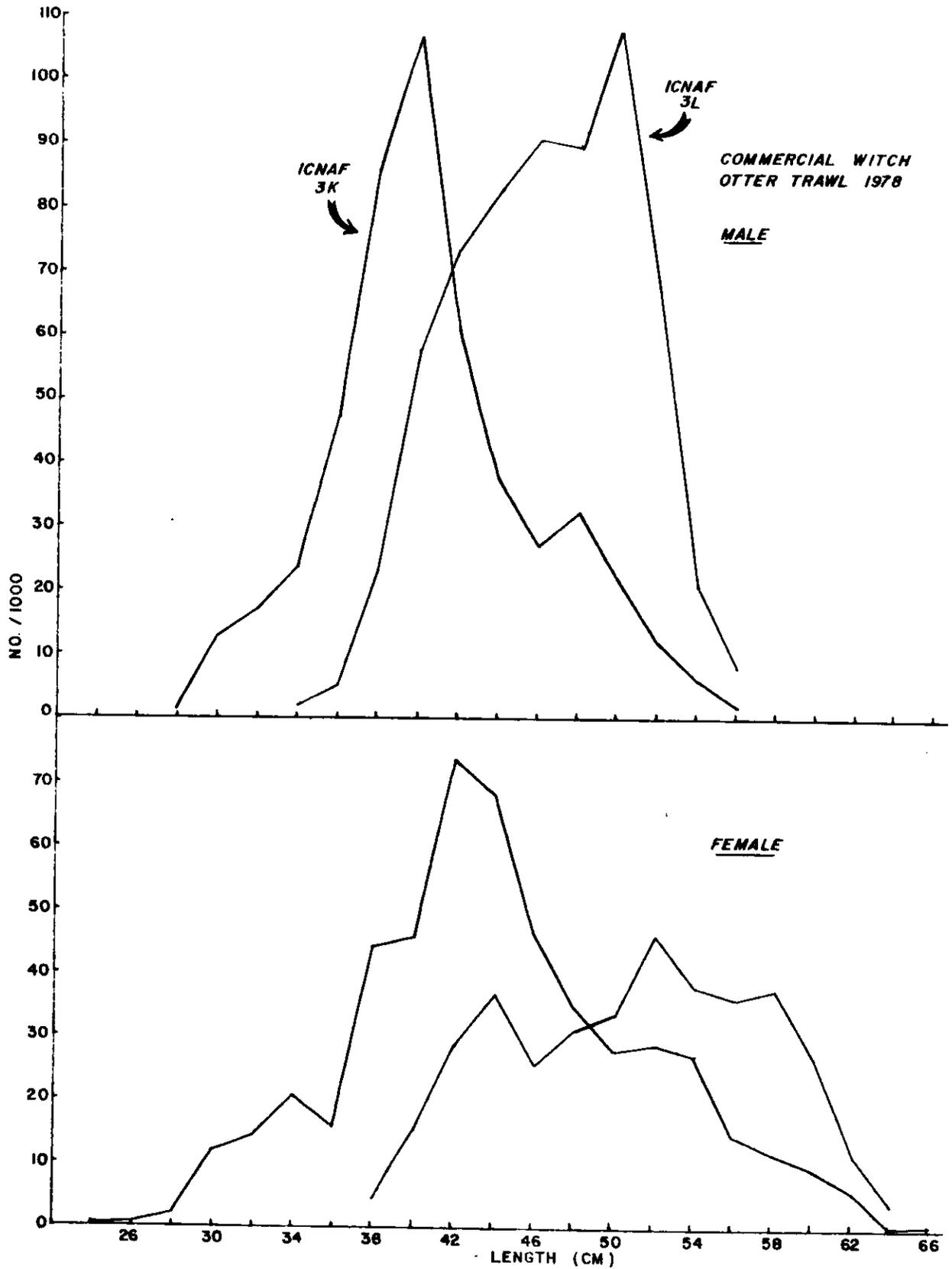


Fig. 2. Length distributions of commercial otter trawl witch catches in stock area 2J+3KL for 1978.

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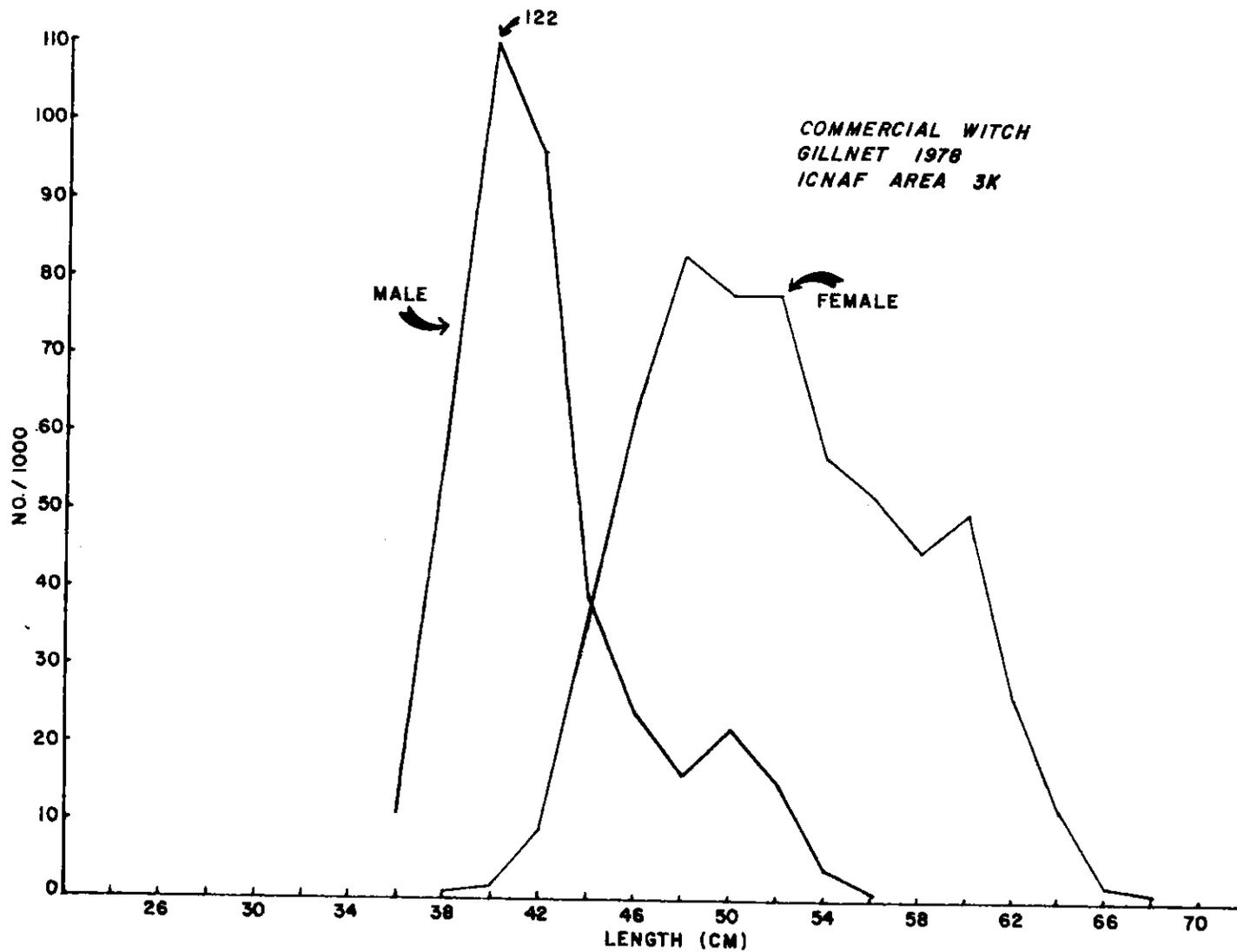


Fig. 3. Length distributions of commercial gillnet witch catches in stock area 2J+3KL for 1978.

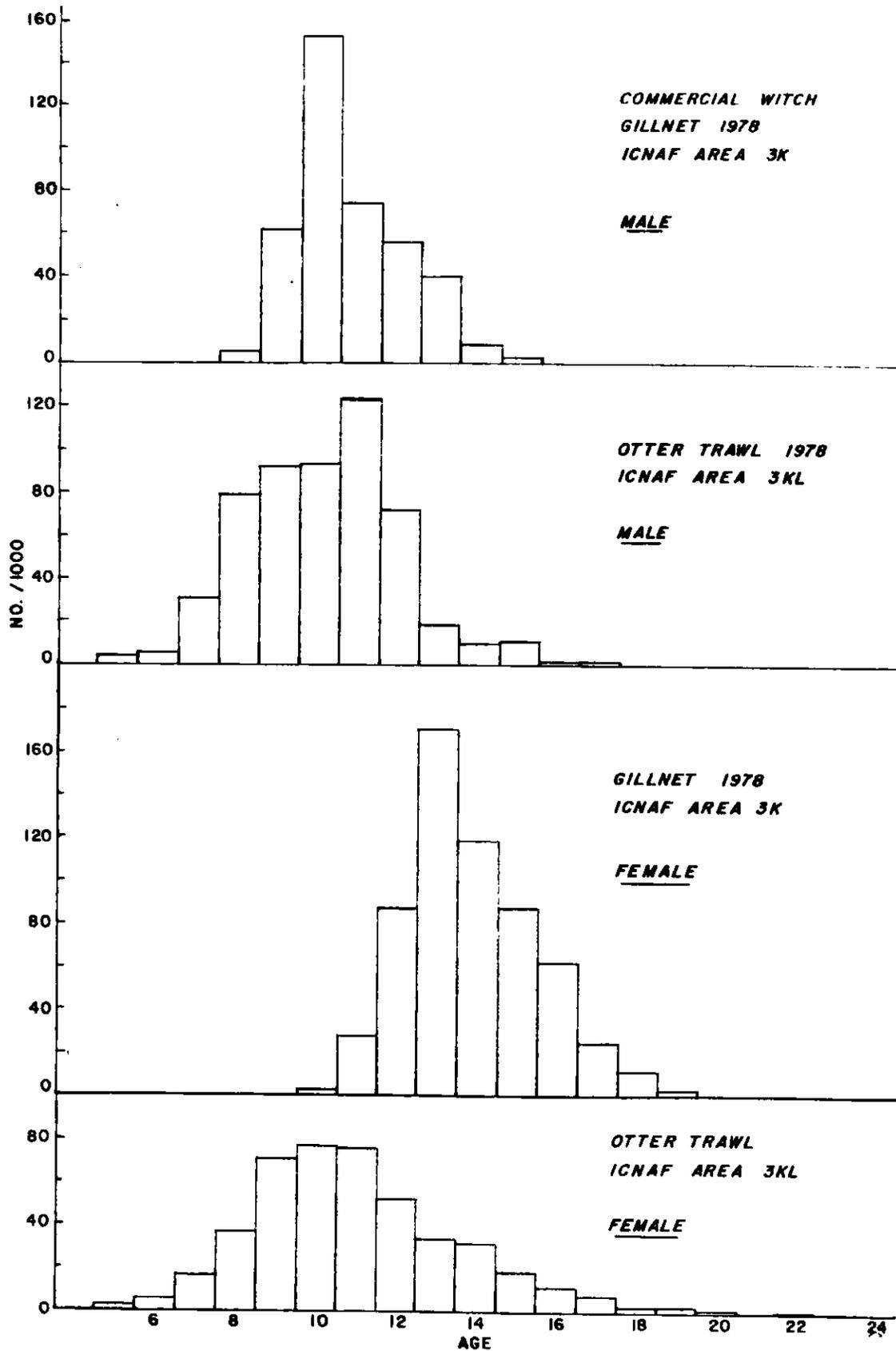


Fig. 4. Age distributions of commercial witch catches in stock area 2J+3KL for 1978.

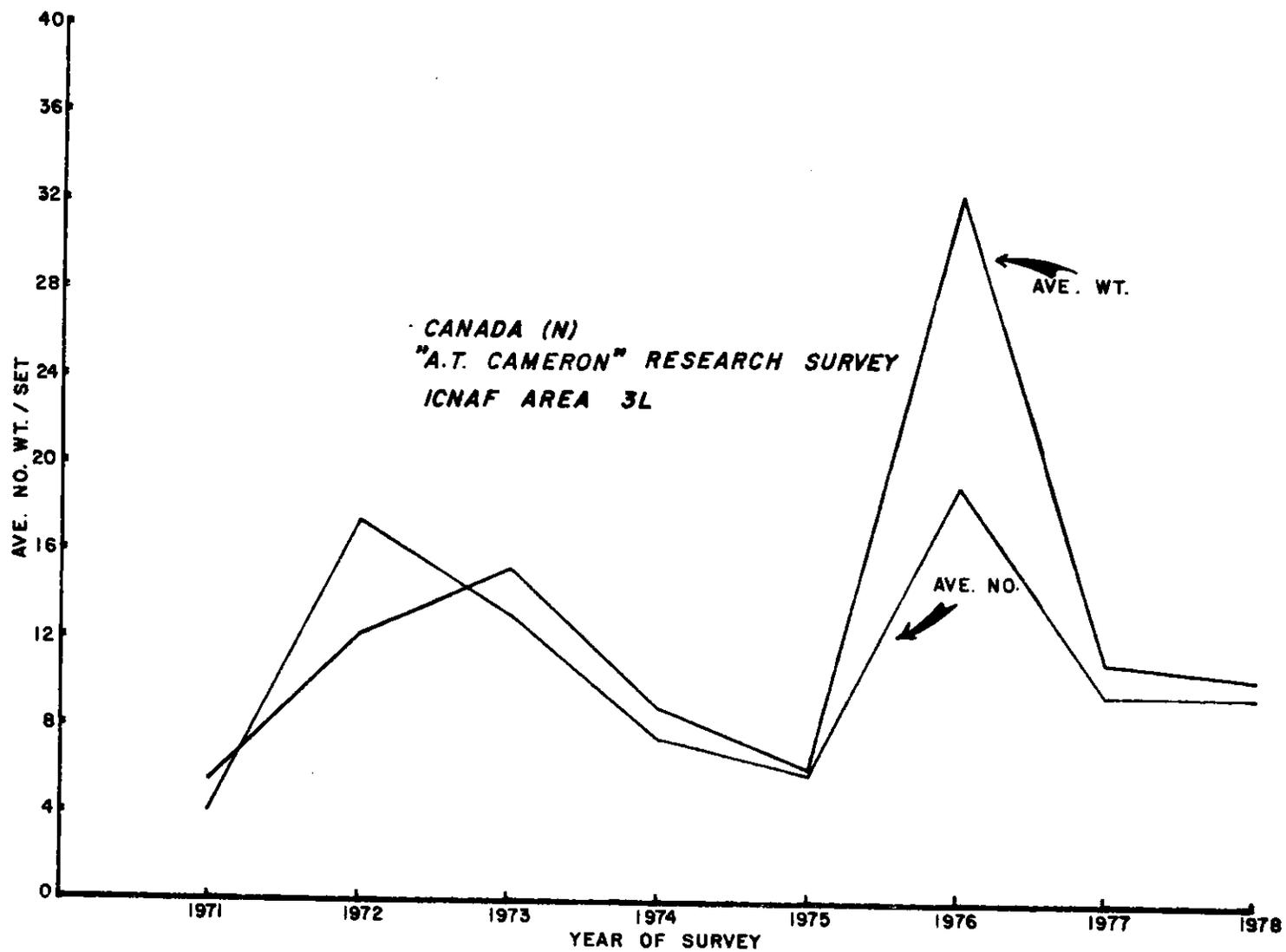


Fig. 5. Average numbers and weights per set of witch from biomass surveys 1971-78 for Division 3L.

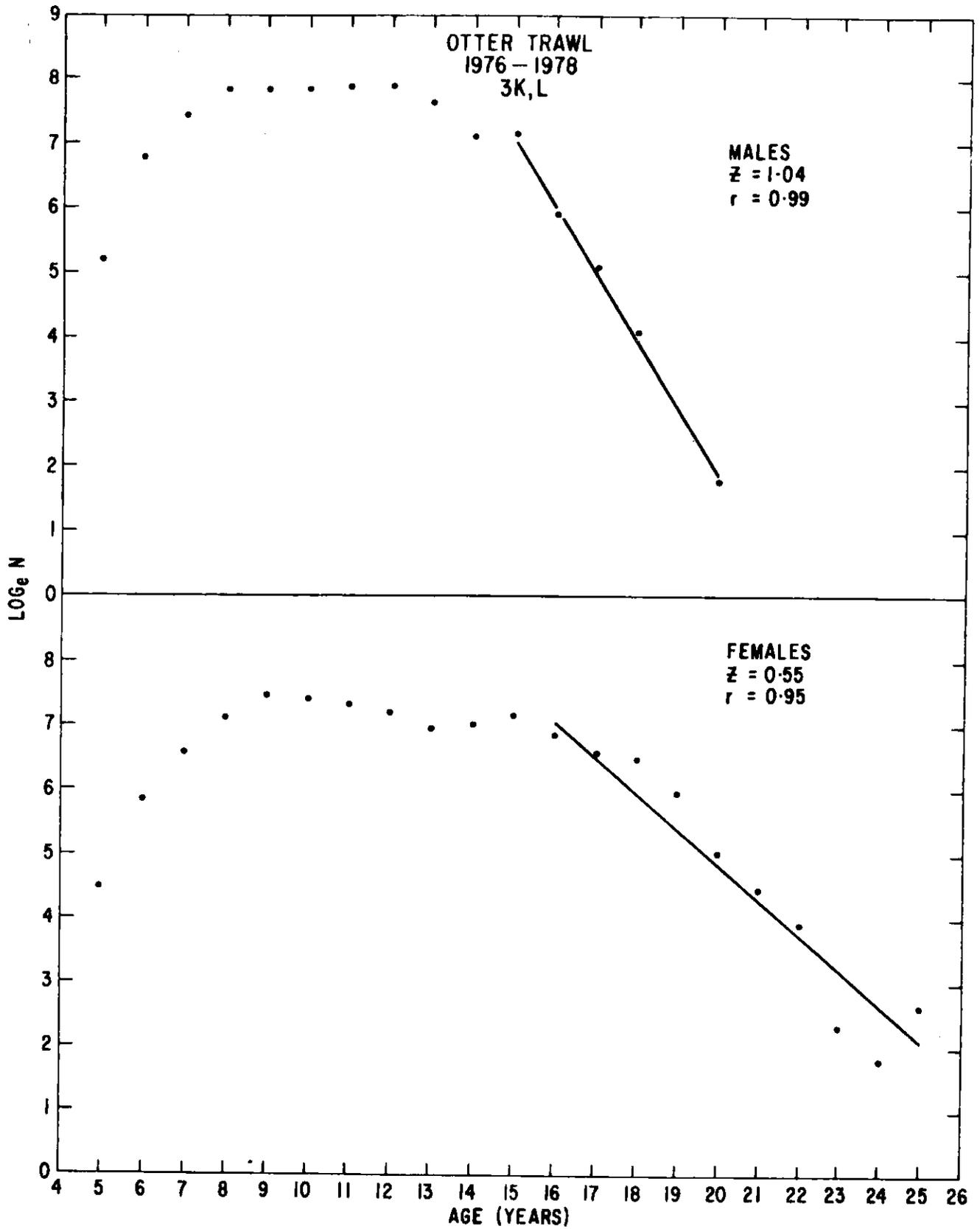


Fig. 6. Catch curves for male and female commercial otter trawl fish 1976-78 for stock area 2J+3KL.

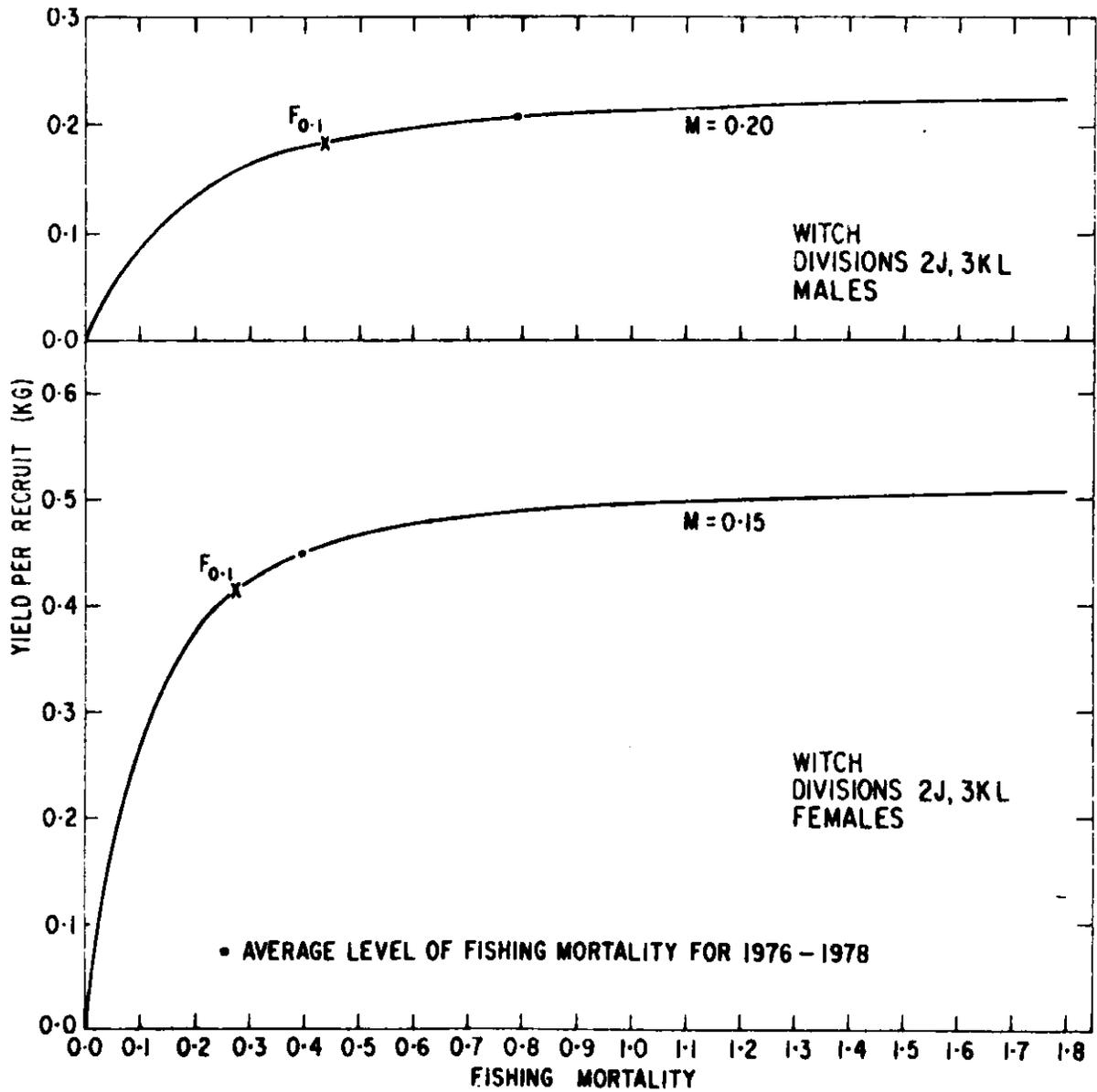


Fig. 7. Yield-per-recruit curves for male and female witch for stock area 2J+3KL.