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Canadian Atlantic Fisheries
Scientific Advisory Committee

CAFSAC
Research Document # 82/ 26

Update of Division 30 Redfish Assessment

by

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Abstract

Catches of redfish in Div. 30 continue to be mainly composed of small fish, approximately 22-30 cm in length. Larger fish have been located at the greater depths by research surveys, but these depths are often difficult to trawl. The standardized catch rate series through the 1970's has shown a general increase, a period during which the catches have averaged 14,000 t.

Résumé

Les sébastes capturés dans la division 30 sont toujours principalement des individus de petite taille (environ 22-30 cm de long). Des recensements ont révélé la présence de plus gros spécimens à des profondeurs qui se prêtent souvent mal à la pêche au chalut. La série des taux de capture standardisés des années 1970 montre une augmentation générale; durant cette période, les prises se sont élevées, en moyenne, à 14 000 t.

Introduction

Nominal catches through the 1970's have varied from 20,000 t in 1971 to 7000 t in 1978. Catches were relatively high in 1979 and 1980 (18,000 and 17,000 t respectively) but decreased to 12,000 t in 1981 (preliminary). Catches have been below the TAC due to a lack of effort rather than poor catch rates. This has been attributed to the small size of the fish found at trawlable depths (McKone 1978) which decreases their desirability to the fishery.

To evaluate the status of the stock, the catch rate series was updated and the commercial length frequencies and the population age structure as determined by a Canadian research vessel survey in 1979 were examined.

Materials and Methods

Redfish directed effort was defined as the effort associated with those catches where redfish comprised 50% or more of the nominal catch. Data for 1959-79 were obtained from the ICNAF/NAFO Statistical Bulletins while preliminary data for 1980 and 1981 were available for Canadian (M and N) vessels only, from the Department of Fisheries and Oceans, Economics Branch. Data were standardized using the multiplicative model developed by Gavaris (1980), using categories of vessel type, month, and year in the regression. The abundance index derived from the regression was the predicted relative power of the years.

Length frequencies from the Canadian (M and N) bottom trawl and the USSR bottom and midwater trawl fisheries in 1981 were available for comparison.

Estimates of the abundance at age were available from the 1979 stratified random survey in Div. 30 conducted by the Canadian research vessel, GADUS ATLANTICA. The survey covered all strata from 185-730 m except one at 550-730 m which was missed due to rough bottom. The estimates obtained should, therefore, be reasonably representative of the population, except for the older age groups.

Results and Discussion

The regression results of the multiplicative model were highly significant (Table 1), with the vessel type category contributing most to the regression. Trends in the relative power of years are shown in Table 2 and plotted in Fig. 1 (1968 missing). A small general increase was suggested through the 1970's, a period when catches averaged 14,000 t.

The commercial length frequencies showed the bulk of the catch to be composed of 22-30 cm fish (Fig. 2-4). This was similar to the length frequencies of previous years (1978-80) (Gavaris 1981). While the fishery has been based on a narrow range of small sized fish, catch rates have remained generally stable or increased slightly which suggested that fish of these lengths are abundant in the population.

The age frequency of the population (Fig. 5) showed ages 8-10 to be most abundant (the early 1970's Year-classes). Ages from 14-19 were much less numerous.

Abundance of these ages would probably be somewhat underestimated due to the omission of a stratum at 550-730 m. Fish in the older age categories have not generally been an important component of the commercial catch.

Catch rates have shown a general increase during the 1970's, during a period when the catches have averaged 14,000 t, well below the present TAC of 20,000 t. The commercial catch is mainly composed of small sized fish, 22-30 cm approximately, although larger fish are present in the population. The larger fish are found at the greater depths which are often difficult to trawl.

References

- Gavaris, C. A. 1981. An assessment of redfish in Division 30. CAFSAC Res. Doc. 81/38.
- Gavaris, S. 1980. Use of a multiplicative model to estimate catch rate and effort from commercial data. Can. J. Fish. Aquat. Sci. 37: 2272-2275.
- McKone, W. D. 1978. Division 30 redfish assessment. CAFSAC Res. Doc. 78/20.

Table 1. Results of the regression, weighted by effort, of \ln (catch rate) versus vessel type, month, and year categories (Type 1, 2, and 3 respectively) for Division 30 redfish.

MULTIPLE R, 0.964
 MULTIPLE R SQUARED, 0.929

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DF	SUMS OF SQUARES	MEAN SQUARES	F-VALUE
INTERCEPT	1	1.146E2	1.146E2	
REGRESSION	36	1.822E2	5.062E0	113.359
TYPE 1	6	4.158E1	6.931E0	155.202
TYPE 2	9	6.253E0	6.947E ⁻¹	15.558
TYPE 3	21	9.527E0	4.537E ⁻¹	10.159
RESIDUALS	312	1.393E1	4.466E ⁻²	
TOTAL	349	3.107E2		

Table 2. The nominal catch, catch rate trends, and standardized effort for Division 30 redfish, 1959-81. The proportion of the nominal catch used in the standardization procedure is also listed.

YEAR	TOTAL CATCH	PROP.	RELATIVE POWER		EFFORT
			MEAN	S.E.	
1959	9268	0.914	1.000	0.000	9268
1960	5030	0.941	0.860	0.092	5845
1961	11394	0.770	0.846	0.076	13469
1962	7557	0.707	0.453	0.046	16673
1963	9194	0.462	0.689	0.066	13344
1964	20232	0.401	0.551	0.054	36714
1965	22438	0.329	0.415	0.042	54034
1966	15305	0.003	0.331	0.160	46188
1967	19037	0.028	0.893	0.202	21319
1969	15878	0.435	0.614	0.066	25876
1970	13192	0.780	0.522	0.051	25257
1971	19792	0.533	0.654	0.067	30274
1972	16117	0.309	0.494	0.055	32635
1973	8797	0.907	0.715	0.088	12299
1974	13124	0.582	0.668	0.077	19657
1975	15110	0.340	0.647	0.080	23371
1976	15348	0.670	0.838	0.090	18316
1977	10850	0.809	0.767	0.081	14144
1978	6860	0.823	0.661	0.073	10376
1979	17737	0.724	1.032	0.107	17191
1980	17306	0.056	0.668	0.112	25908
1981	11569	0.223	0.970	0.140	11926

AVERAGE C.V. FOR THE MEAN: 0.128

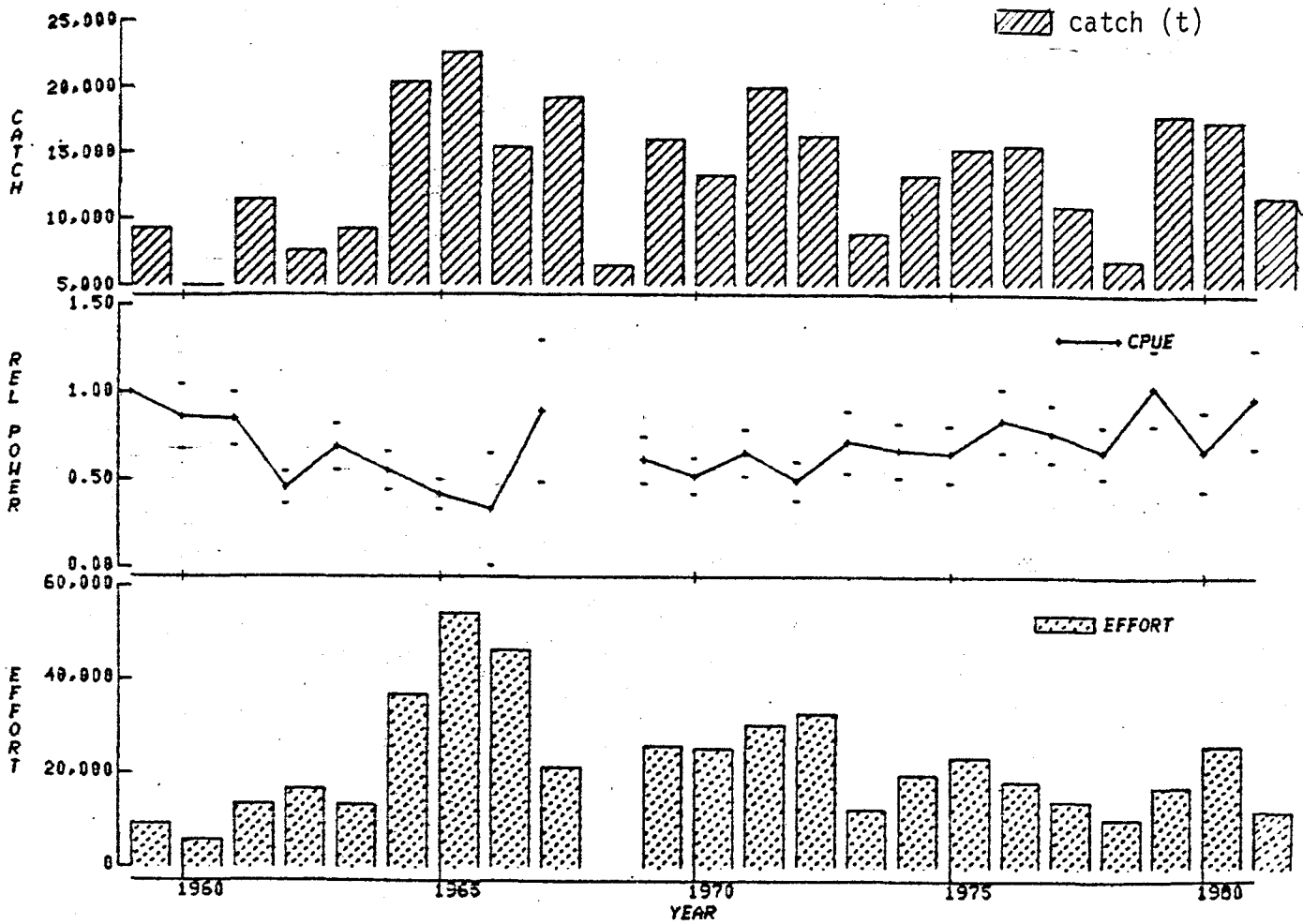


FIG. 1. NOMINAL CATCHES (t), RELATIVE POWER OF YEARS WITH 95% C.I. AND STANDARDIZED EFFORT (HR) FOR DIV. 30 REDFISH, 1959-1981. CATCH RATE AND EFFORT DATA FOR 1968 WERE MISSING DUE TO LOW DIRECTED EFFORT.

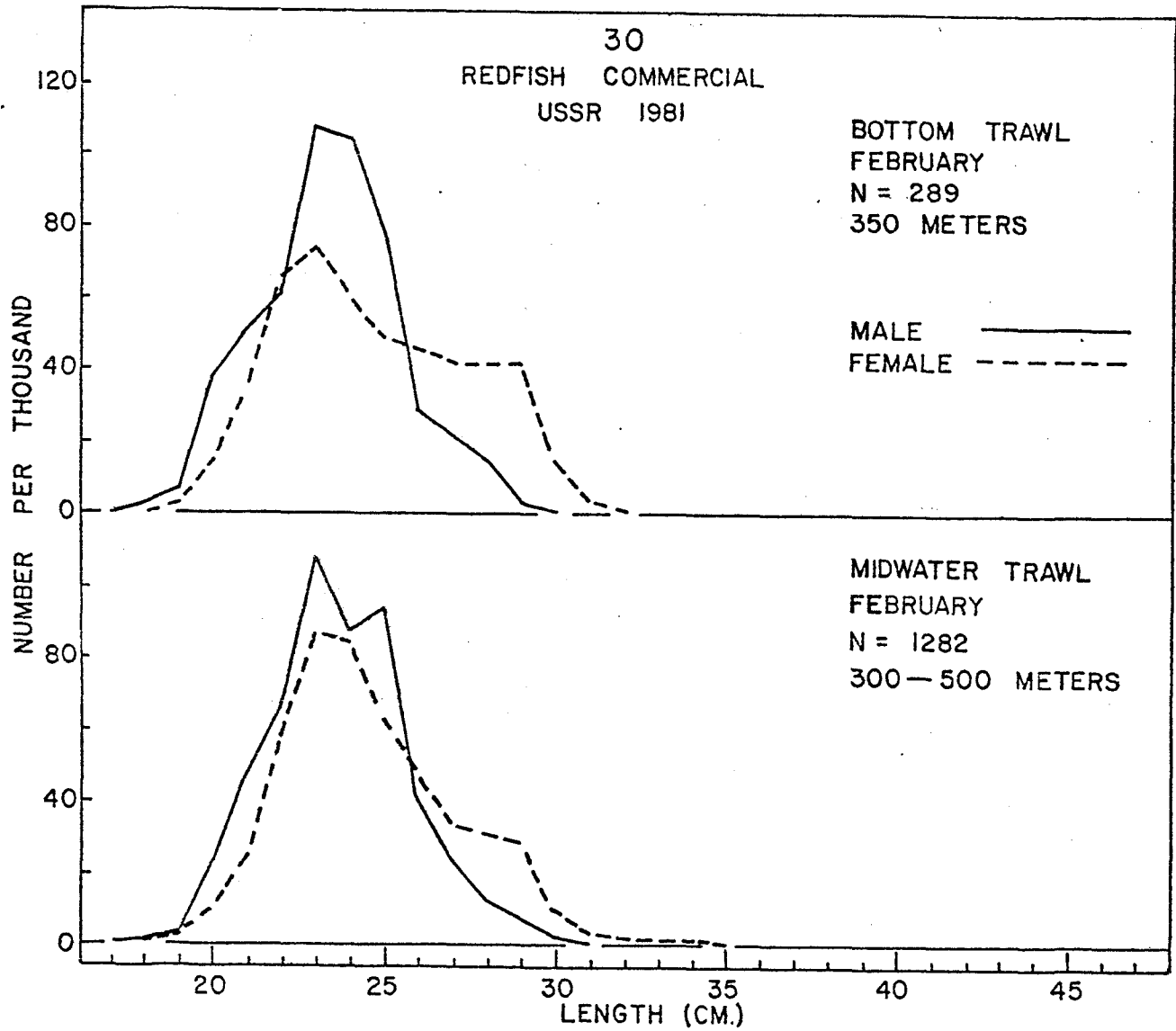


Fig. 2. Commercial length frequencies (no. per mille) for Division 30 redfish in 1981 from USSR bottom trawl and midwater trawl vessels.

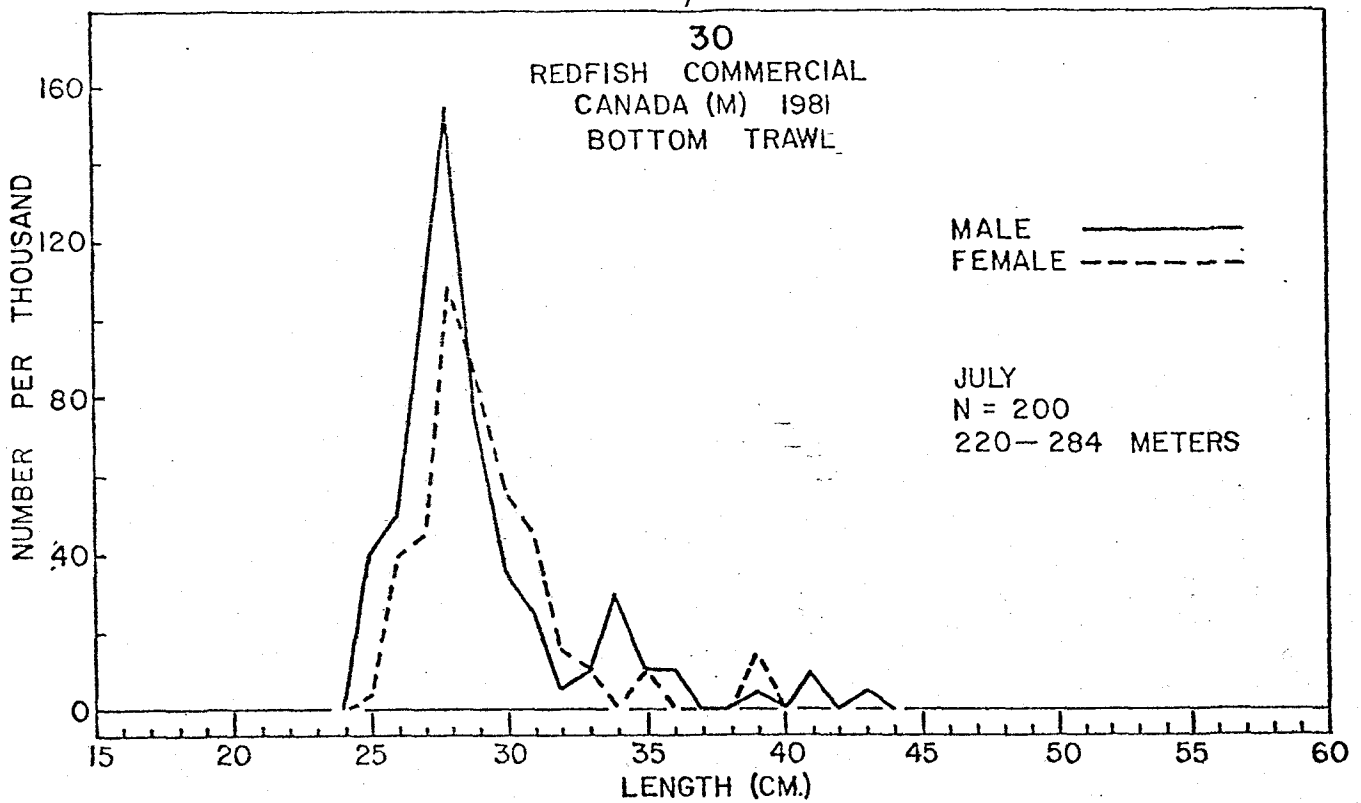


Fig. 3. Commercial length frequencies (no. per mille) for Division 30 redfish in 1981 from Canada (M) bottom trawl vessels.

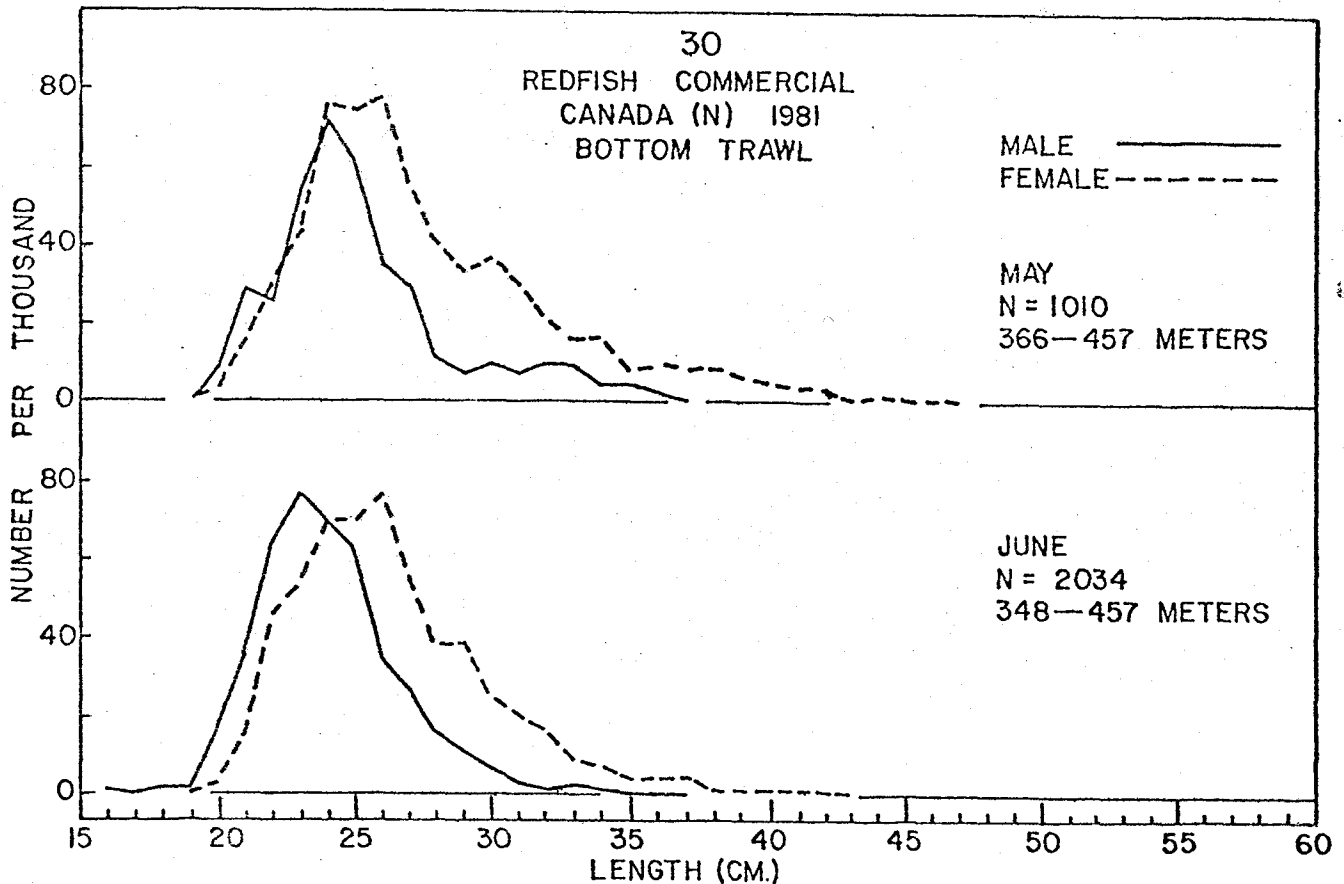


Fig. 4. Commercial length frequencies (no. per mille) for Division 30 redfish in 1981 from Canada (N) bottom trawl vessels.

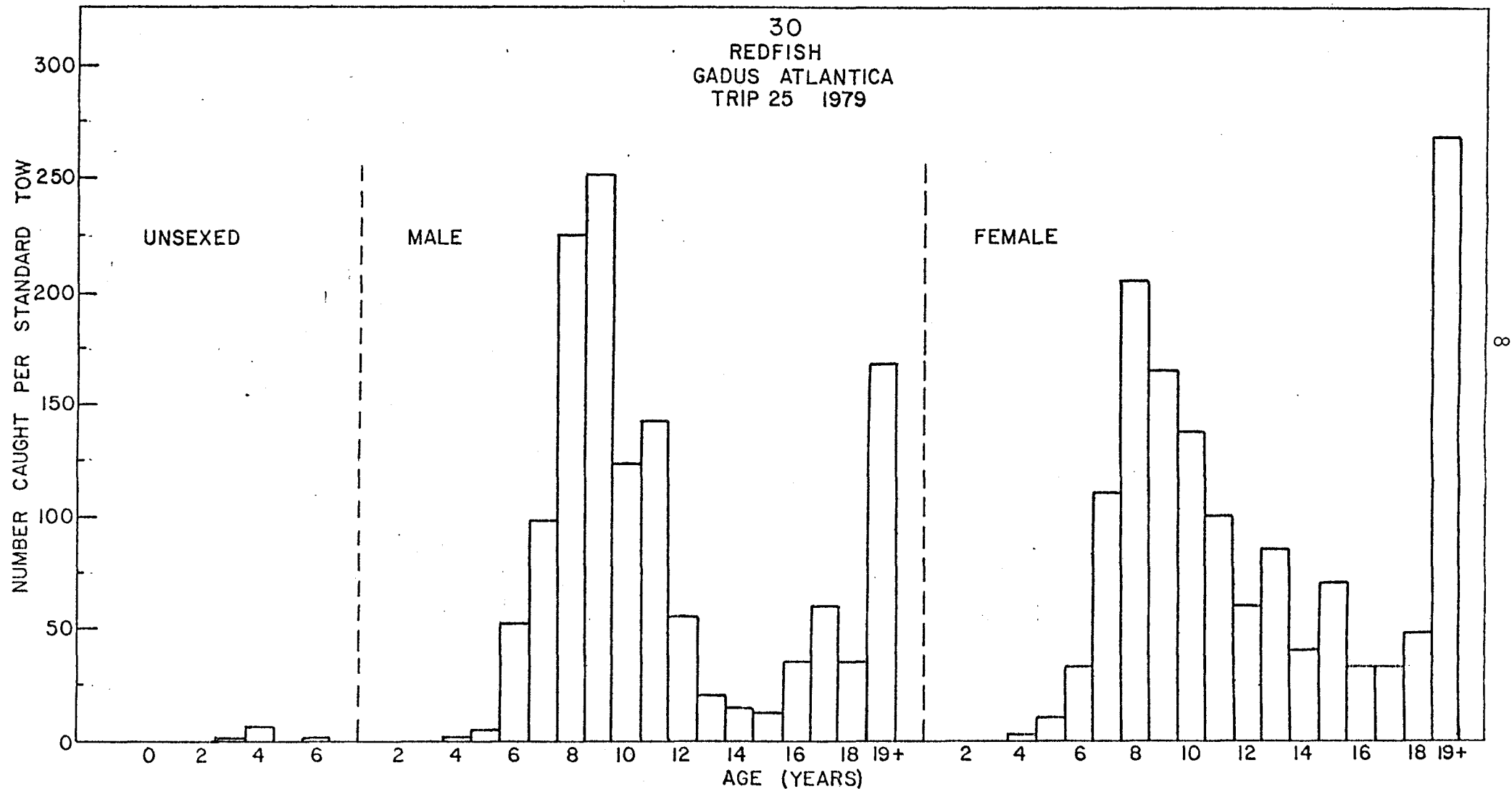


Fig. 5. Age distribution of redfish in Division 30 in 1979 (numbers caught per tow) from a Canadian research vessel survey. As not all strata at the greater depths were covered, the distribution of older ages is probably not representative of the population.