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Assessment of Divisions 3LN Redfish

by

W. D. McKone
Department of Fisheries and Environment
Fisheries and Marine Service
Research and Resource Services
St. John's, Newfoundland

Introduction

This paper follows the same lines as the one which was done last year by McKone and Parsons (1977) concerning Divisions 3LN redfish stocks. The analysis of the stock was by the simple Schaefer parabola, where yield is a function of the effort expended, and by length frequency data.

Materials and Methods

The major difficulty in assessing the Divisions 3LN stock is that a great deal of the redfish caught is not reported as effort directed towards redfish. Landings and effort were tabulated from the ICNAF Statistical Bulletin Vol. 26 but effort was determined by considering catches in which 50% or greater of the total fish caught was redfish. The standard catch per hour was based on USSR-Poland vessels greater than 1,800 tons.

Length frequency data from Canada for both sexes have been plotted for research by depth and commercial by month and depth. Additionally, commercial length frequencies are expressed as bottom trawl and midwater trawl. Length frequencies were collected on Spanish pair trawls as a result of the observer program, started in 1977. Spanish observers were sent onboard Spanish vessels under the direction of the Canadian Fisheries and Marine Service.

Results and Discussion

Catches of redfish from Division 3L continue to be high (78%) relative to those from Division 3N and the bottom trawl catches high (73%) relative to midwater trawl which dominated the fishery in 1974. Landings declined from a high of 34,000 m t in 1971 to 20,512 m t in 1976 due to quota regulations.

Effort remained stable over the past two years at 11,890 hrs in 1975 and 11,788 hrs in 1976 which is not reflected in the landings which varied from 18,000 m t to 20,500 m t during the same period (Fig. 1). The trend in catch per unit effort has been to increase from 1.07 m t per hour in 1971 to 1.74 m t per hour in 1976 which is a reverse of the catch for the same period.

The yield parabola (Fig. 2) estimates the MSY for Divisions 3LN redfish stocks to be in the neighbourhood of 20,000 m tons and the equilibrium yield at two-thirds effort would be 18,000 m t. From 1976 catch statistics the yield was higher than expected by the model with the effort expended. The 1976 point lies to the left and above the equilibrium line described by the parabola (Fig. 2). Thus the stock appears to be showing some recovery from the heavy fishing which took place in the early 1970's. The research length frequency data from bottom trawl were collected from a commercial trawler chartered by the Fisheries and Marine Service, Canada, during October 1977 (Fig. 3 and 4). Standard commercial gear was used with instructions to fish Divisions 3LN at sites selected at random stratified by the depth fished. For both Division 3L and Division 3N, the length of both sexes increased with increasing depth (Fig. 3 and 4). In Division 3L (Fig. 3) the most predominant length classes at 274-366 metres were

27 cm for males and 29 cm for females which increased to 32 cm for both sexes at 368-549 metres and to 34 cm for males and 36 cm for females at 549-732 metres of depth. The most common length class in Division 3N (Fig. 4) in shallow water (183-274 m) was 23 cm for both sexes. Similarly lengths for both sexes were 23 cm at 276-366 m, 4 cm smaller than males at the same depth in Division 3L and 6 cm smaller for females. The length class most commonly caught at 368-549 m in Division 3N was 33 cm for both sexes which was slightly smaller than for Division 3L at the same depth. Thus, there are length class differences between the two areas but the trend is towards larger fish at a greater depth. If these differences in length are the result of local stock differences which remain separated throughout the year, the unequal fishing pressure between the two Divisions (i.e. higher in Division 3L) could cause problems in the management of these two Divisions together.

There is good evidence of recruiting year-classes (Fig. 5) in the samples taken in Division 3N which supports what was found in Canadian commercial samples in 1976 (McKone and Parsons, 1977).

Canadian commercial midwater trawl length frequencies for Division 3N compare favourably with those of Division 3L for the most common length classes which range between 31 and 37 cm for both sexes over the fishing season (Fig. 6). Similarly, the most predominant length classes from bottom trawl during the fishing season was from 29 to 36 cm for both sexes in Division 3L (Fig. 7). There appears to be little difference in the selection of length classes by these two types of gear. Nor are there any marked differences in the length classes caught throughout the fishing season as was found for 1976 (McKone and Parsons, 1977) for Division 3L where the most common length class caught was 37 to 39 cm for males and 40 to 44 cm for females by midwater trawl during May, June and July while later in the year the length classes compared favourably with those this year.

From discards of the Spanish pair trawlers, it is evident some commercial size redfish are being lost by the redfish fishery (Fig. 8). The most commonly caught males were 37 cm and 40 cm for females. The ratio of total catch of redfish to cod caught remained relatively low throughout the sampling period, and the impact on the redfish stocks appears to be minimal (Pitt, 1977).

In summary, with the effort remaining relatively stable over the last two years but the catch increasing and the catch per unit effort increasing, thus the stock biomass appears to be increasing. The estimates of maximum sustainable yield are far from satisfactory, however, because of the problems of estimating directed effort. Additionally, the general production model assumes recruitment is adequate to replace the yield and no real measure of recruitment has been presented for consideration other than the catch per half hour tow which indicates a presence of small fish in Division 3N but none were observed in Division 3L. In order that a more adequate assessment be performrf, better estimates of recruitment and sufficient length and age sampling of the commercial catch must be forthcoming. Therefore, it is concluded that the TAC for 1979 should remain at 16,000 tons.

References

McKone, W. D. and D. G. Parsons. 1977. An update of the assessment of redfish from Subarea 2 + Div. 3K, Div. 3M, Div. 3LN, and Div. 3Ø. Intern. Comm. Northw. Atlant. Fish. Res. Doc. 77/18, Ser. No. 5038.

Parsons, L. S. and D. G. Parsons. 1975. An evaluation of the status of ICNAF Divisions 3P, 3Ø and 3LN redfish. Intern. Comm. Northw. Atlant. Fish. Res. Bull. 11: 5-16.

Pitt, T. K. 1977. Report on the Spanish biological observer program, 1977. Unpublished manuscript, Research and Resource Services, Fish. and Mar. Serv., St. John's, Nfld., 1977.

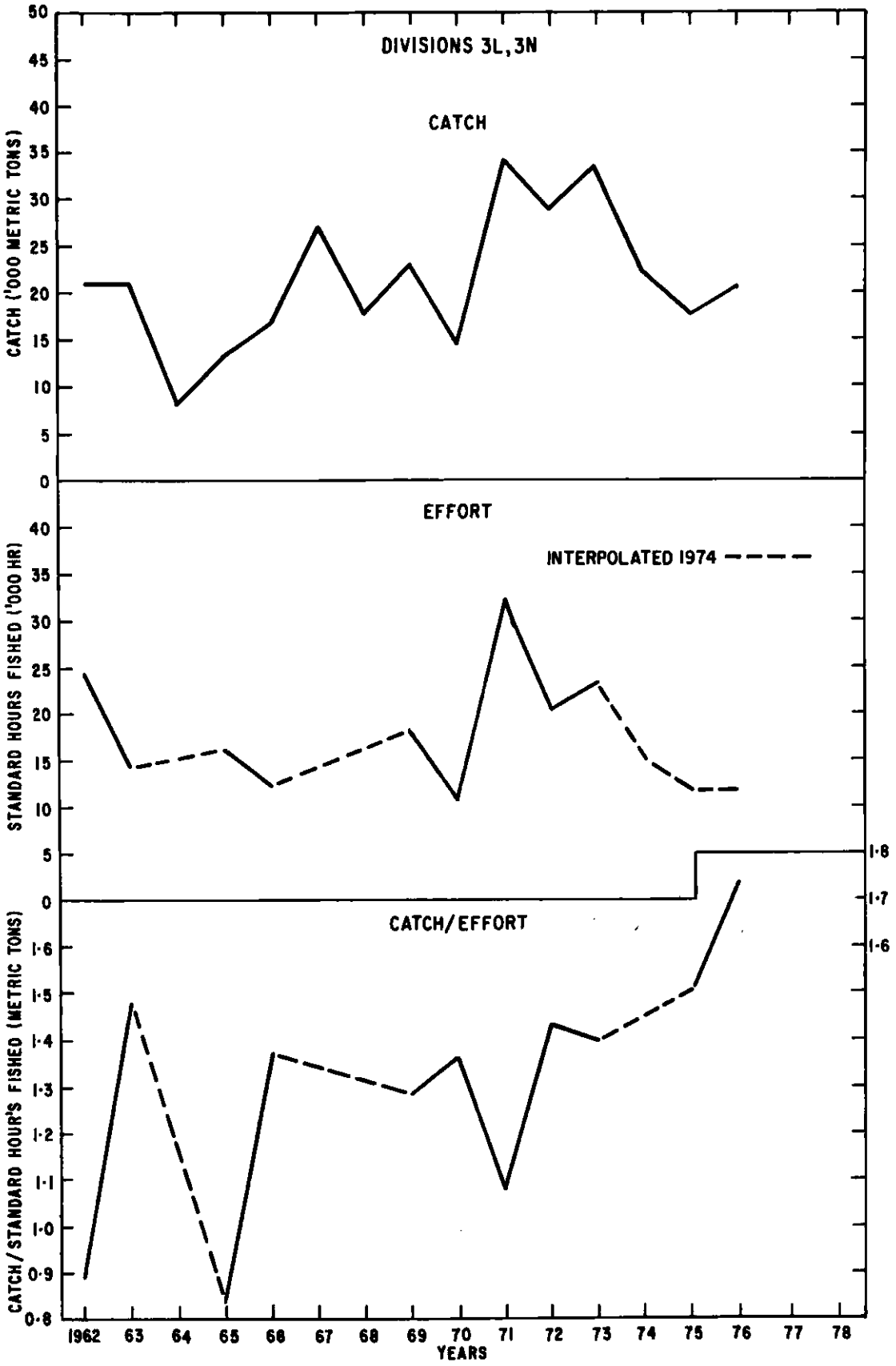

Figure 1. Trends in nominal redfish catch effort and catch per unit effort in standardized trawler units following the method of Parsons and Parsons 1975 with 1972-76 added for Div. 3LN.

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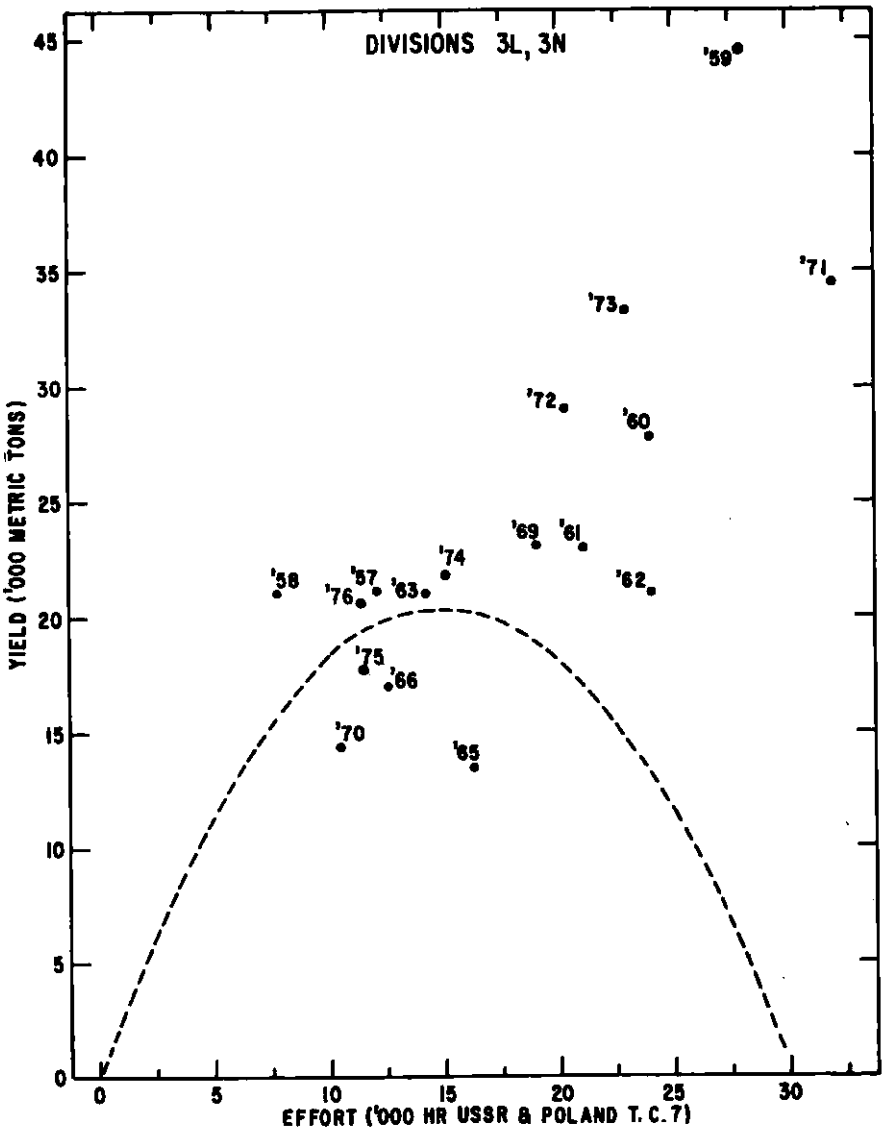

Fig. 2. Yield curves for redfish Div. 3LN derived from catch per unit effort for standard hours fished from Parsons and Parsons 1975 extended to include 1972-76.

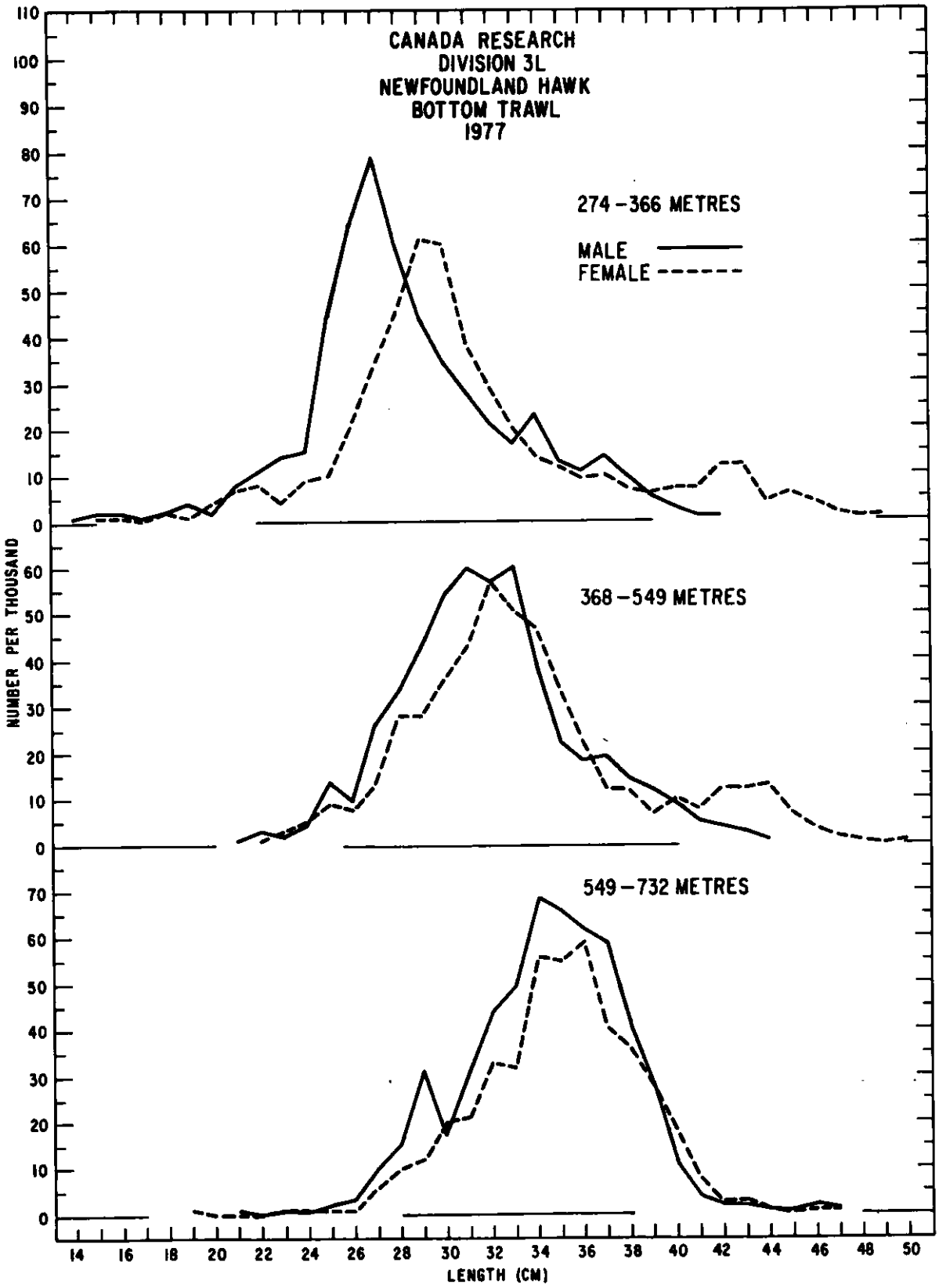

Fig. 3. Canadian redfish research bottom trawl length frequencies for Div. 3L.

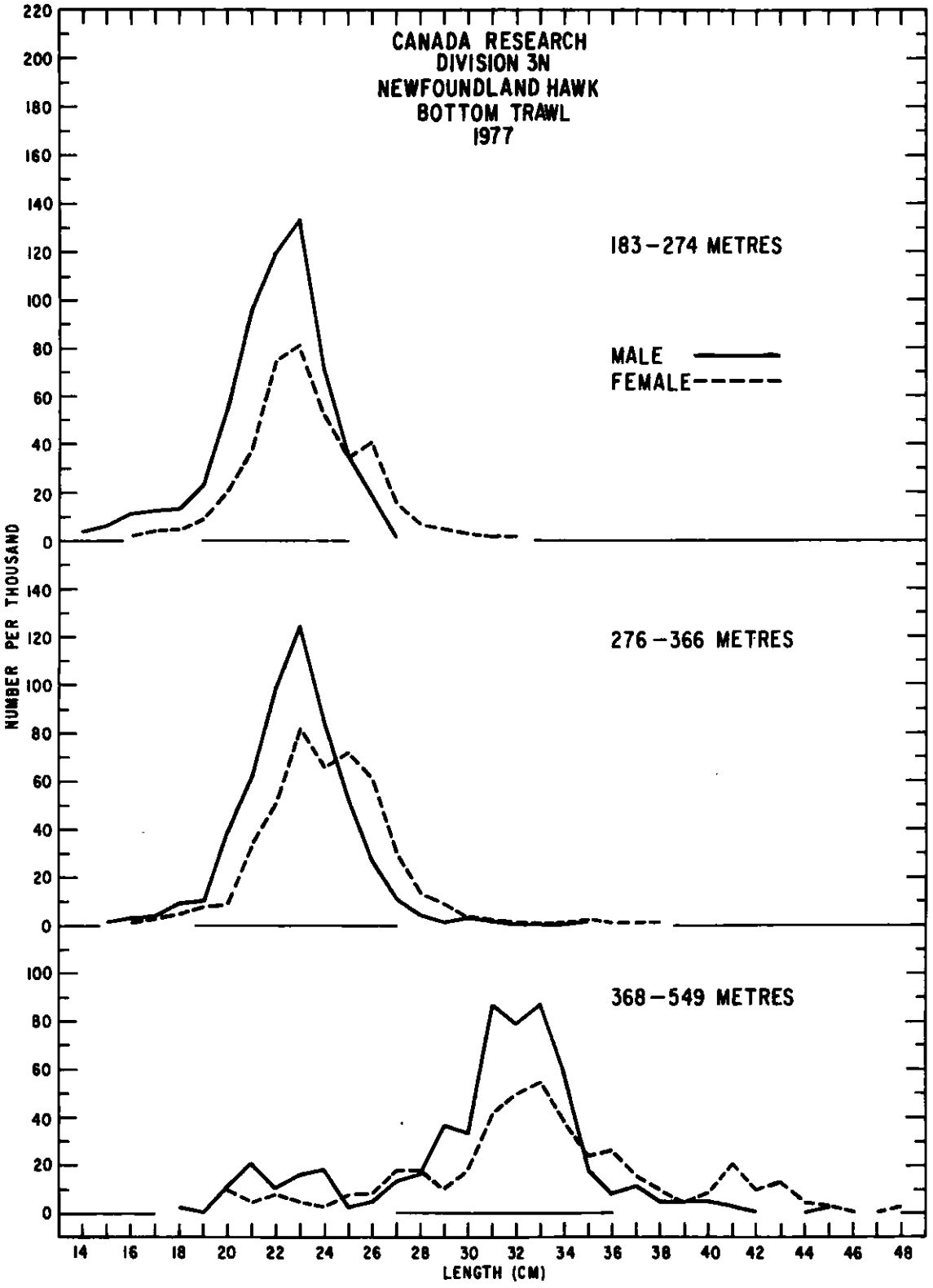

Fig. 4. Canadian redfish research bottom trawl length frequencies for Div. 3N.

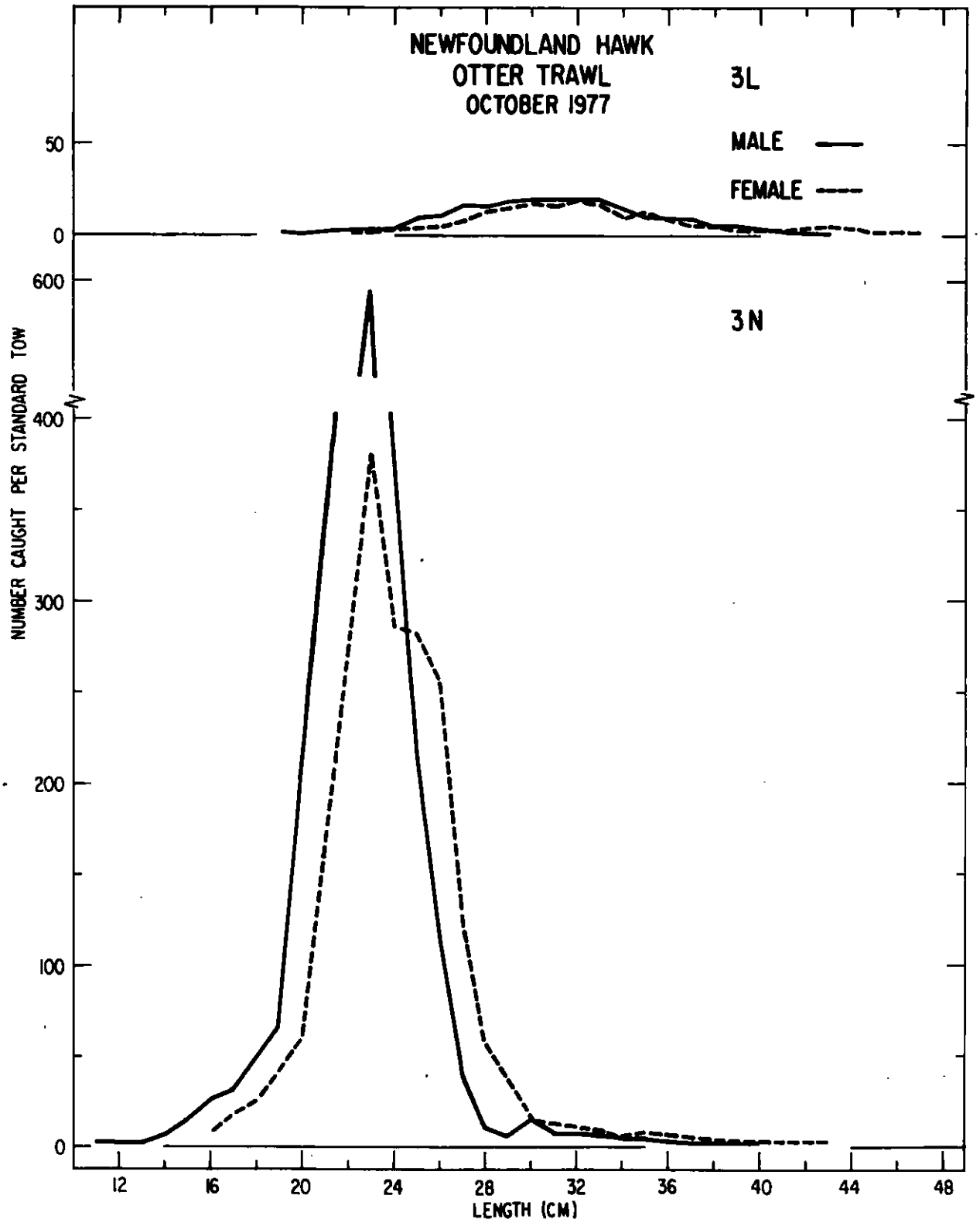

Fig. 5. Canadian redfish research bottom trawl catch per half-hour tow in Div. 3L.

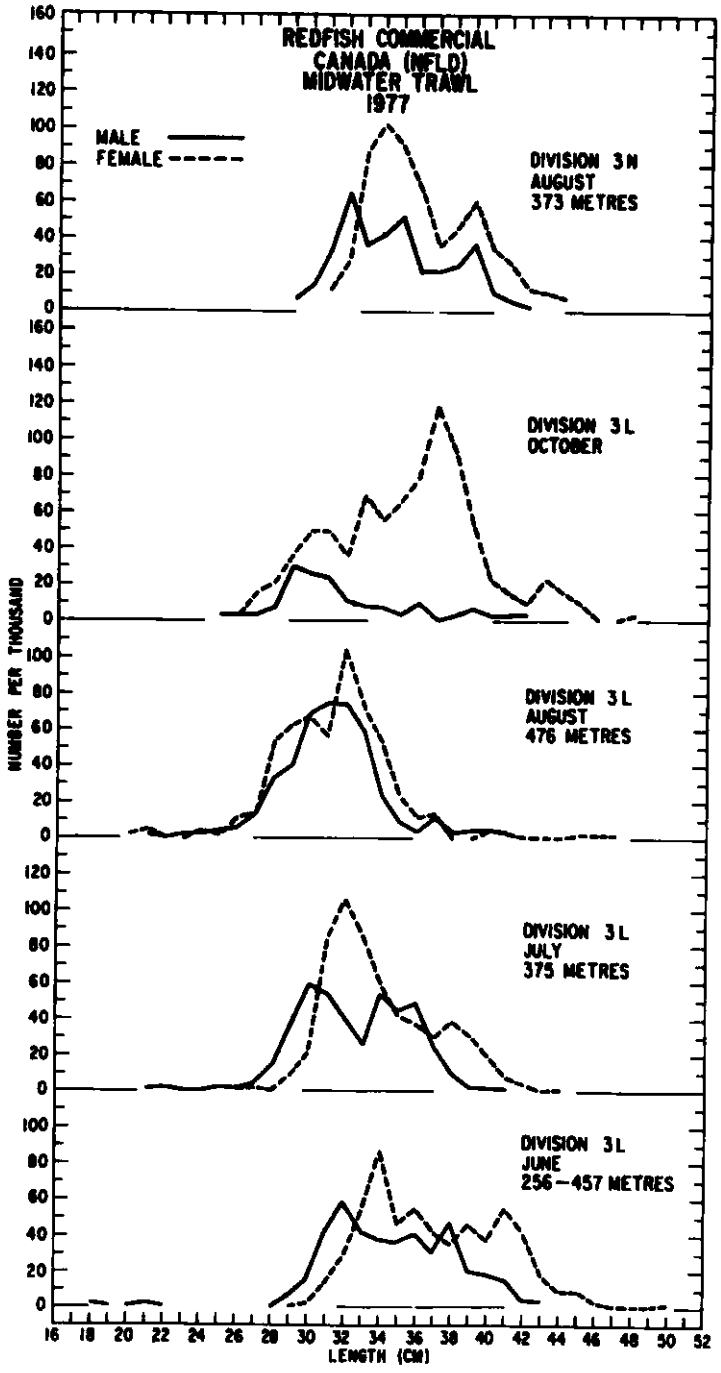

Fig. 6. Canadian redfish commercial midwater trawl length frequencies for Divisions 3LN.

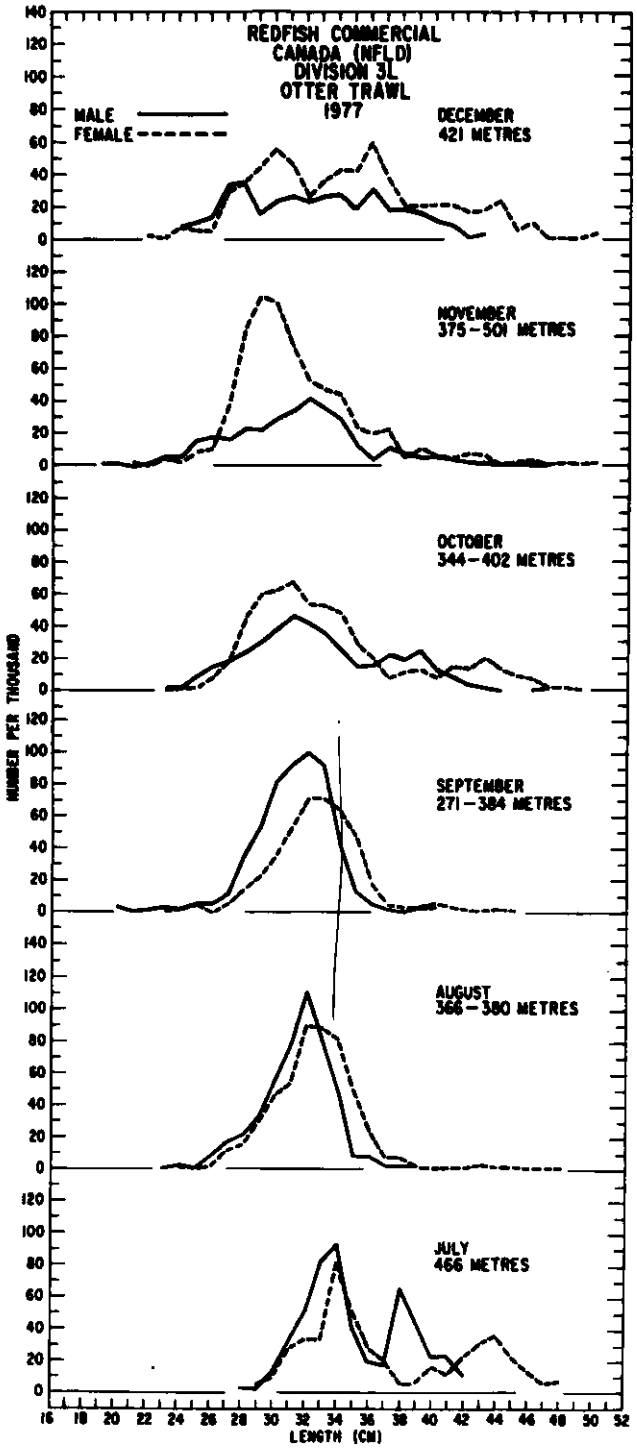

Fig. 7. Canadian redfish commercial bottom trawl length frequencies for Division 3L.

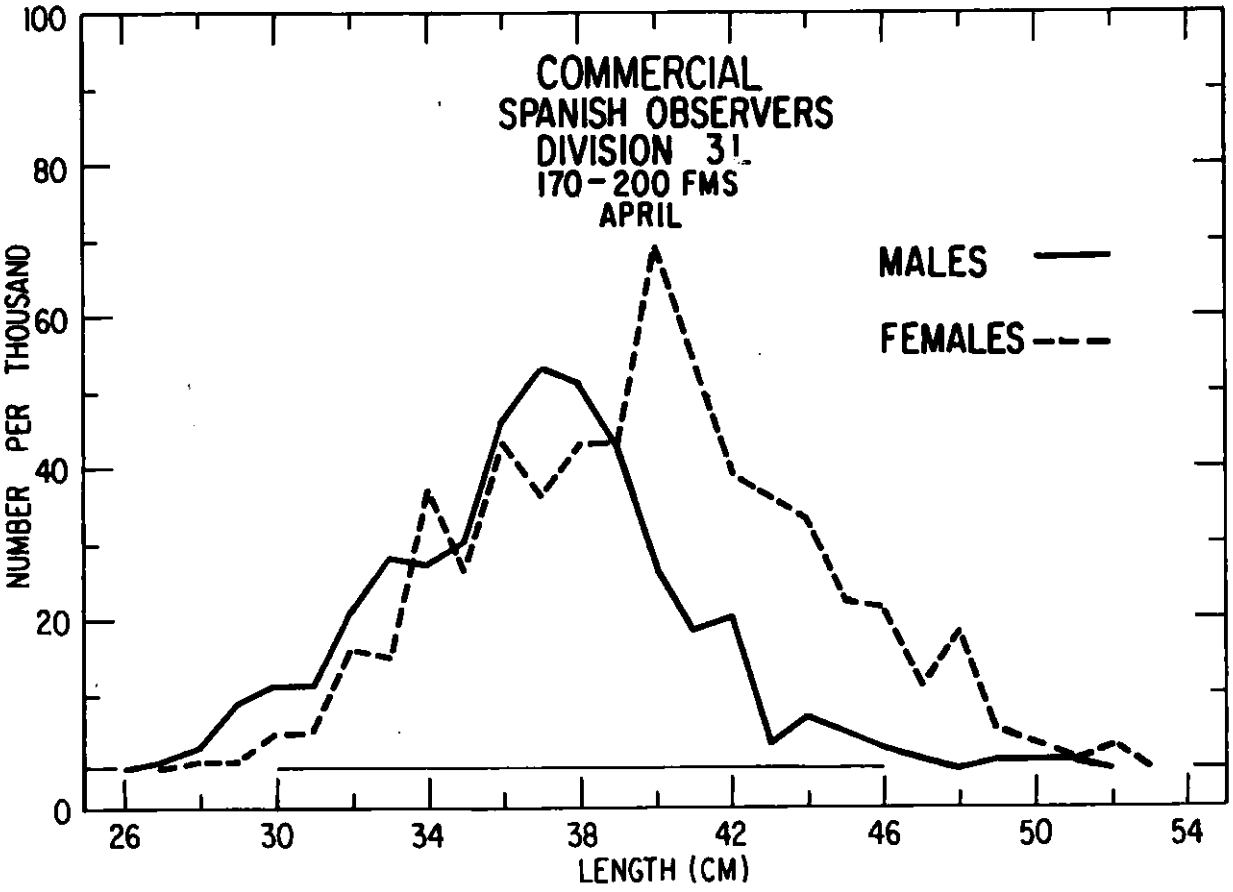

Fig. 8. Spanish commercial pair trawl length frequencies of redfish caught while fishing cod in Div. 3L.