RESTRICTED

International Commission for the Northwest Atlantic Fisheries

Serial No. 3312
(D.c.3)

ICNAF Res.Doc. 74/79

ANNUAL MEETING - JUNE 1973

Some observations on Subarea 2 + Division 3K, Divisions 3L-N and Division 3O redfish

by

L. S. Parsons and D. G. Parsons
Environment Canada
Fisheries and Marine Service
Biological Station
St. John's, Newfoundland.

At the 1973 Annual Meeting of ICNAF the Assessments Subcommittee recommended that total allowable catches for 1974 for redfish in Divisions 3L-N, 3O and 3P should be set at the maximum sustainable yield levels as indicated by general production analyses (Parsons and Parsons, MS 1973). At the January 1974 Special Meeting a total allowable catch for 1974 for Subarea 2 + Division 3K redfish was also recommended based upon a general production study of this stock (Pinhorn and Parsons, MS 1974).

This document presents some general observations on the current status of and examines the very limited length and age data available for these stocks, with the exception of Division 3P which is dealt with elsewhere. The few recent commercial and research length and age frequencies available in the ICNAF Sampling Yearbooks were plotted to ascertain possible trends in recruitment. Size distributions of mentella redfish taken in catches by the Canadian research vessel A. T. Cameron during intermittent survey cruises to Divisions 2J, 3K and 3L from 1959 to 1973 and a 1973 exploratory survey by the Cape Farewell in Division 3N were plotted for comparison. The A. T. Cameron fished a no. 41-5 Yankee otter trawl and the Cape Farewell an Engels-Demone high-opening semipelagic trawl. The codends of both trawls were lined by a 29-mm mesh nylon liner. Generally the following depths were fished where applicable: 125, 150, 175, 200, 250, 300 and 350 fathoms. The length distribution for each survey line was determined by averaging the numbers caught at each length at each depth.

Subarea 2 + Division 3K

Pinhorn and Parsons (MS 1974) considered this stock to be in a depressed condition on the basis of Schaefer-type analyses of catch/effort data. The 1972 catch of 20,033 m. tons, taken in 1560 standard days fished, was well below the equilibrium curve as have been all catches since 1966 (Fig. 1). The catch per standard day fished (12.84 tons) was only slightly more than the 1971 catch per standard day fished of 11.7 tons and less than the 13.2 to 15.0 tons per day obtained during 1967-70.

Polish commercial data (Fig. 2) indicate that the 1972 catch was composed primarily of large, old fish, with modal lengths of 37 cm for males and 44 cm for females. A broad range of ages was represented in the catch with ages 16-19 dominant among the males and ages 24-28 among the females (Fig. 3). Both size and age contrast markedly with Polish data for 1971 (unsexed) which show modal lengths of 27, 29 and 34 cm and predominant ages of 6 to 9 years and a modal age of 7 years in 1971 (Figs. 2 and 3). Large fish were dominant also in 1969, males with modal lengths of 29, 34 and 38 cm and females with several modes at 29, 33, 36, 39 and 45 cm but with the larger fish predominant. No consistent trends in size or age are apparent from these limited commercial data.

Canadian data from intermittent research vessel surveys in Subarea 2 and Division 3K from 1959 to 1973 are depicted in Figs. 4-6. These indicate a preponderance of relatively small redfish 24 to 30 cm on southeast Hamilton Bank (2J) and the eastern edge of Funk Island Bank (3K) in the autumn of 1973, suggesting the possibility of improved recruitment prospects over the next several years. Preliminary age readings suggest that these fish were basically 7- to 11-year-olds with 8-, 9- and 10-year-old fish predominating. Fish of these sizes were present in 1973 USSR research survey data (Fig. 7) but not in such great proportions as in the Canadian survey data.

Chekhova (MS 1974) obtained an average of 475 mentella redfish per hour trawled in Division 3K in 1973, less than the 612 fish per hour obtained in 1972 but more than the 292 fish per hour obtained in 1971. The average catch per hour (kg) showed a similar trend (150 kg per hour in 1973 versus 266 and 125 kg per hour in 1972 and 1971, respectively). Chekhova (MS 1974) reports modal lengths for 1973 of 26.8 cm from the 201-300 m. depth zone and 27.8 cm from the 301-400 m. depth zone in which by far the greatest numbers were caught.

The indications of greater numbers of relatively young fish (8- to 11-year-olds) present in 1973 research catches than in earlier years are somewhat inconclusive since previously in 1967 on the northeast Hamilton Bank survey line there was a similar predominance of 27-31 cm fish with numbers caught per hour exceeding those taken on southeast Hamilton Bank and eastern Funk Island Bank in 1973; also 6- to 9-year-old fish were dominant in the 1971 Polish commercial age composition data contrasted with much older fish in 1972 (Fig. 3). Nonetheless, the possibility of improved recruitment prospects together with the doubling of the catch from 20,000 m. tons in 1972 to about 40,000 m. tons in 1973, probably as a result of increased fishing effort directed toward these younger fish, provide further reason to restrict the catch in 1975 to no more than the 1974 total allowable catch of 30,000 m. tons to permit the stock to rebuild.

Divisions 3L-N

Preliminary catch statistics indicate that the 1973 redfish catch from this area was 38,177 m. tons, the highest catch ever. Catches from this stock during 1971-73 have averaged 33,800 m. tons, considerably in excess of the estimated maximum sustainable yield level of 20,000 m. tons (Parsons and Parsons, MS 1973). Catch per hour fished by vessels of the standard tonnage category (> 1800 tons) increased from 1.073 tons in 1971 to 1.427 tons in 1972. The estimated 20,275 standard hours fished to produce the 1972 total catch of 28,933 m. tons were in excess of the effort required to produce the maximum sustainable yield under equilibrium conditions (Fig. 8).

With the exception of a length measurement of 1351 redfish by Japan in 1970, no commercial length or age data have been available for this stock since 1967 despite the increased catches of recent years (a total of approximately 156,500 m. tons of redfish were taken from this area during 1968-73).

USSR research survey data for 1968, 1969 and 1970 are presented in Figs. 9 and 10. These length distributions were generally multimodal for both males and females with no consistent trends apparent. A broad range of sizes was evident in all three years (Fig. 9). USSR research age distributions for 1969 and 1970 are basically similar (Fig. 10). Nine- to twelve-year-old fish made up the bulk of the research catches of males both in 1969 and 1970 but 11- and 12-year-olds were apparently less abundant in 1970. The females were predominantly 9- to 14-years-old in 1969 and 10- to 15-years-old in 1970. Modal age of the females was 12 in 1969 and 13 in 1970.

Canadian research vessel data (Figs. 11 and 12) indicate a preponderance of fish less than 30 cm in Divisions 3L and 3N in 1973. Modal lengths of the males were 22, 27 and 36 cm in Division 3L and 22, 26 and 30 cm in Division 3N. Females had the most prominent modes at 23-24 and 27 cm in Division 3L; in Division 3N the dominant modes were at 24 and 27-29 cm. Fewer fish of 26-29 cm were caught per hour fished in Divisions 3L-N than in Subarea 2 - Division 3K.

The average number of mentella redfish caught per hour trawling by USSR research vessels in Division 3N (from which the bulk of the 3L-N redfish catch is obtained) increased to 645 fish per hour in 1973 from 366 fish per hour in 1972, but was still only fifty per cent of the 1298 fish per hour caught in 1971 (Chekhova, MS 1974). The average catch per hour (kg) showed a similar trend, increasing from 43 kg per hour in 1972 to 161 kg per hour in 1973, but was still about 35 per cent less in 1973 than in 1971. Mean lengths in 1973 were 12.6 cm in 101-200 m., 23.5 cm in 201-300 m. and 27.6 cm in 301-400 m., the depth zone in which the greatest catch rates were obtained. This compares with 1972 mean lengths of 18.2 cm in 101-200 m., 20.1 cm in 201-300 m. and 25.9 cm in 301-400 m. (Chekhova, MS 1973).

Because of the lack of data on the size and age composition of the commercial catches during recent years, it is impossible to ascertain the extent to which the recent increases in catches have been based upon small redfish 20-30 cm in length which have been the dominant sizes caught in research surveys. It appears highly unlikely that catches from this stock can be sustained at the level of 1971-73 (average catch 33,800 m. tons) or the level of the 1974 total allowable catch of 28,000 m. tons. It would seem wise to limit catches to the level of the estimated maximum sustainable yield - 20,000 m. tons - until such time as adequate data become available, as recommended by the Assessments Subcommittee at the 1973 Annual Meeting.

Division 30

Parsons and Parsons (MS 1973) derived an estimated maximum sustainable yield of 19,000 m. tons for the redfish stock in Division 30 by a simplified application of the Schaefer model (Fig. 13). This was considered to be an over-estimate since the simplified application of the Schaefer model does not adjust for rapid changes in fishing effort or marked fluctuations in year-class strength. The Assessments Subcommittee at the 1973 Annual Meeting of ICNAF recommended a total allowable catch for 1974 of 15,000 m. tons.

The total catch declined from 19,792 m. tons in 1971 to 16,117 m. tons in 1972 and provisional catch statistics indicate a further decline to about 10,000 m. tons in 1973. The 1972 standard catch per hour of 0.828 tons was slightly above the catch rates of 1970 and 1971 but less than the 1.003 tons obtained in 1969. An estimated effort of 19,465 standard hours fished (standard unit of effort the Canada (Nfld) tonnage class 4 otter trawler hour) was expended in 1972, placing the 1972 catch on the equilibrium yield curve (Fig. 13).

With the exception of length measurements of 400 unsexed and 200 sexed redfish collected by Japan in 1970 from exploratory catches, no commercial length or age data have been available for this stock since 1968. Length distributions of USSR research catches in Division 30 in 1969 and 1972 are shown in Fig. 14. The size range of the males in the research catches was approximately the same in both years, with the bulk of the fish between 20 and 32 cm. The dominant modes were at 23 cm in 1969 and 25 cm in 1972. Females exhibited a broader length range in 1969 (basically 21-39 cm) than in 1972 when the majority of the females were between 20 and 32 cm. The dominant mode in 1969 was at 35 cm with less prominent modes at 23, 26 and 32 cm whereas in 1972 24-25 cm fish were dominant with a less prominent mode at 22 cm. Chekhova (MS 1973) reported mean lengths of 18.8 cm in 101-200 m. and 201-300 m. and 22.2 cm in 301-400 m. during 1972 USSR research surveys, with the best catch rates being obtained in the 101-200 m. depth zone.

USSR age composition data (Fig. 14) indicate that males in the 1972 research catches ranged in age from 6 to 12 years with a modal age of 9; females ranged in age from 6 to 14 years with modal ages of 8 and 9.

In the 1973 USSR research surveys an average of 884 redfish were caught per hour fished in Division 30 compared with 498 and 214 fish per hour in 1972 and 1971, respectively (Chekhova, MS 1974). The average catch per hour was 114, 62 and 24 kg in 1973, 1972 and 1971, respectively. Best catch rates were obtained from the 201-300 m. depth zone where the average length of the redfish was 20.6 cm.

No data are available to indicate the extent to which the Division 30 redfish fishery in recent years has been based upon the small redfish dominant in the USSR research surveys. In view of the lack of length and age data for recent commercial catches, there would appear to be no reason to change the 1973 recommendation of the Assessments Subcommittee that the total allowable catch from this stock be limited to 15,000 m. tons until such time as adequate data become available.

References

Chekhova, V. A. MS 1973. The trawling survey of groundfish in the Newfoundland area. Intern. Comm. Northw. Atlant. Fish. Annual Meet. Res. Doc. 73/40, Serial No. 2979, 6 p.

MS 1974. Groundfish trawl survey in the Newfoundland area in 1973. Intern. Comm. Northw. Atlant. Fish. Annual Meet. Res. Doc. 74/54, Serial No. 3263, 6 p.

Parsons, L. S., and D. G. Parsons. MS 1973. An evaluation of the status of ICNAF Divisions 3P, 30 and 3LN redfish. Intern. Comm. Northw. Atlant. Fish. Annual Meet. Res. Doc. 73/88, Serial No. 3042.

Pinhorn, A. T., and L. S. Parsons. MS 1974. Status of the redfish fishery in ICNAF Subarea 2 and Division 3K. Intern. Comm. Northw. Atlant. Fish. Special Comm. Meet. Res. Doc. 74/5, Serial No. 3148, 5 p.

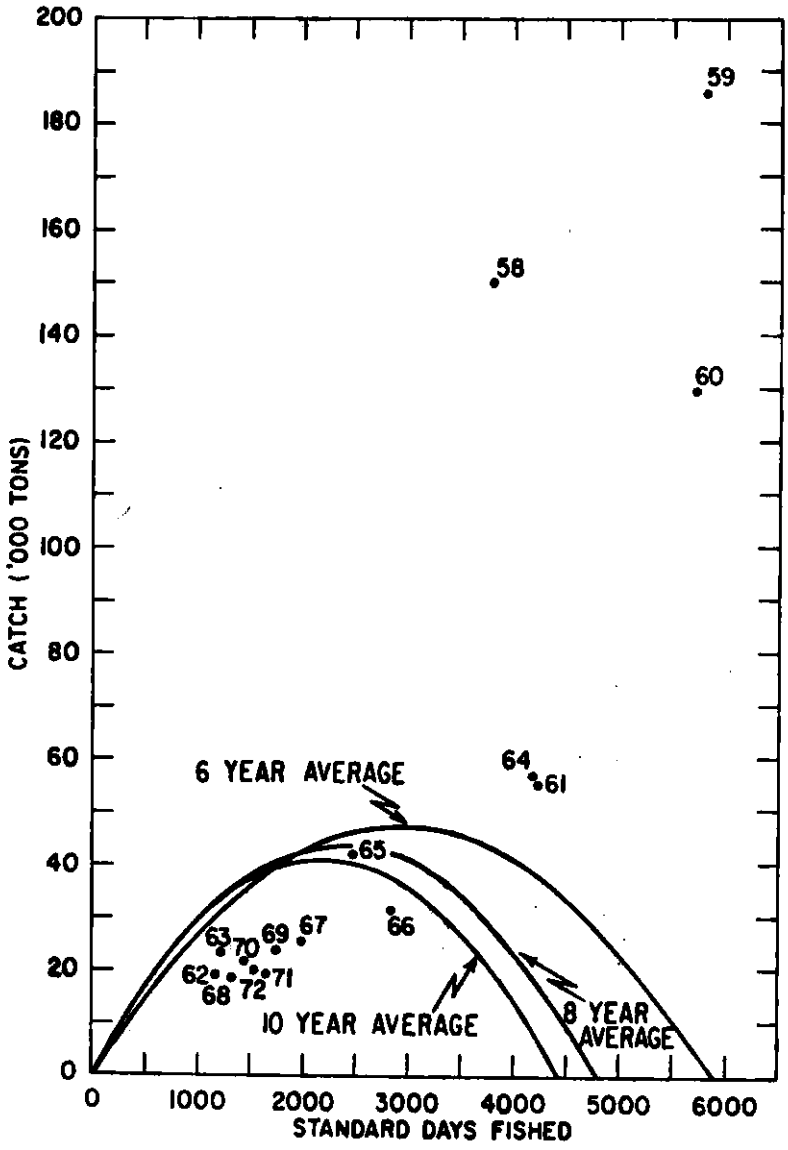


Fig. 1. General production yield curve for Subarea 2 + Division 3K redfish (from Pinhorn and Parsons, MS 1974, with 1972 added).

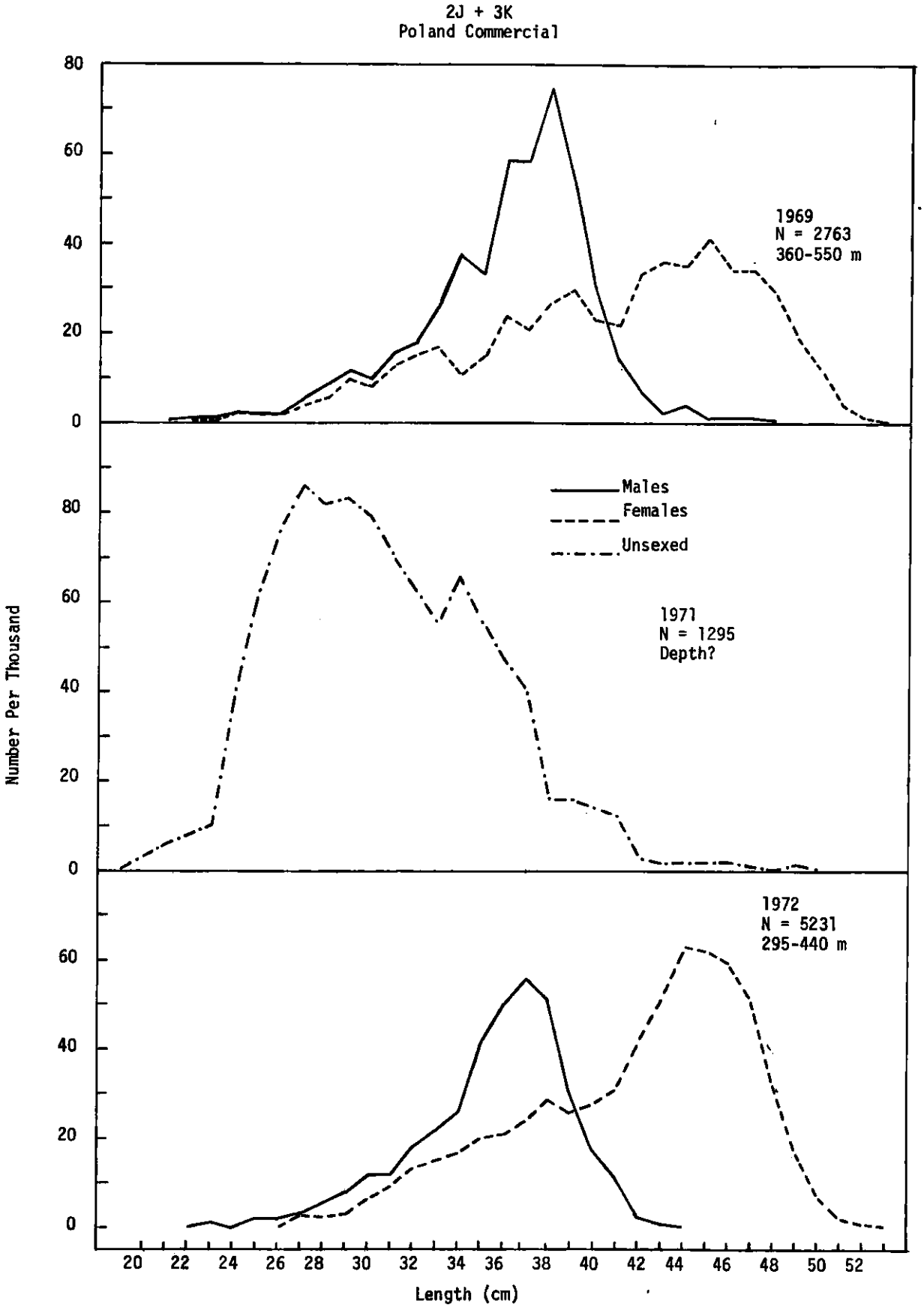


Fig. 2. Length distributions of Polish samples of 1969, 1971 and 1972 commercial redfish catches in Divisions 2J-3K.

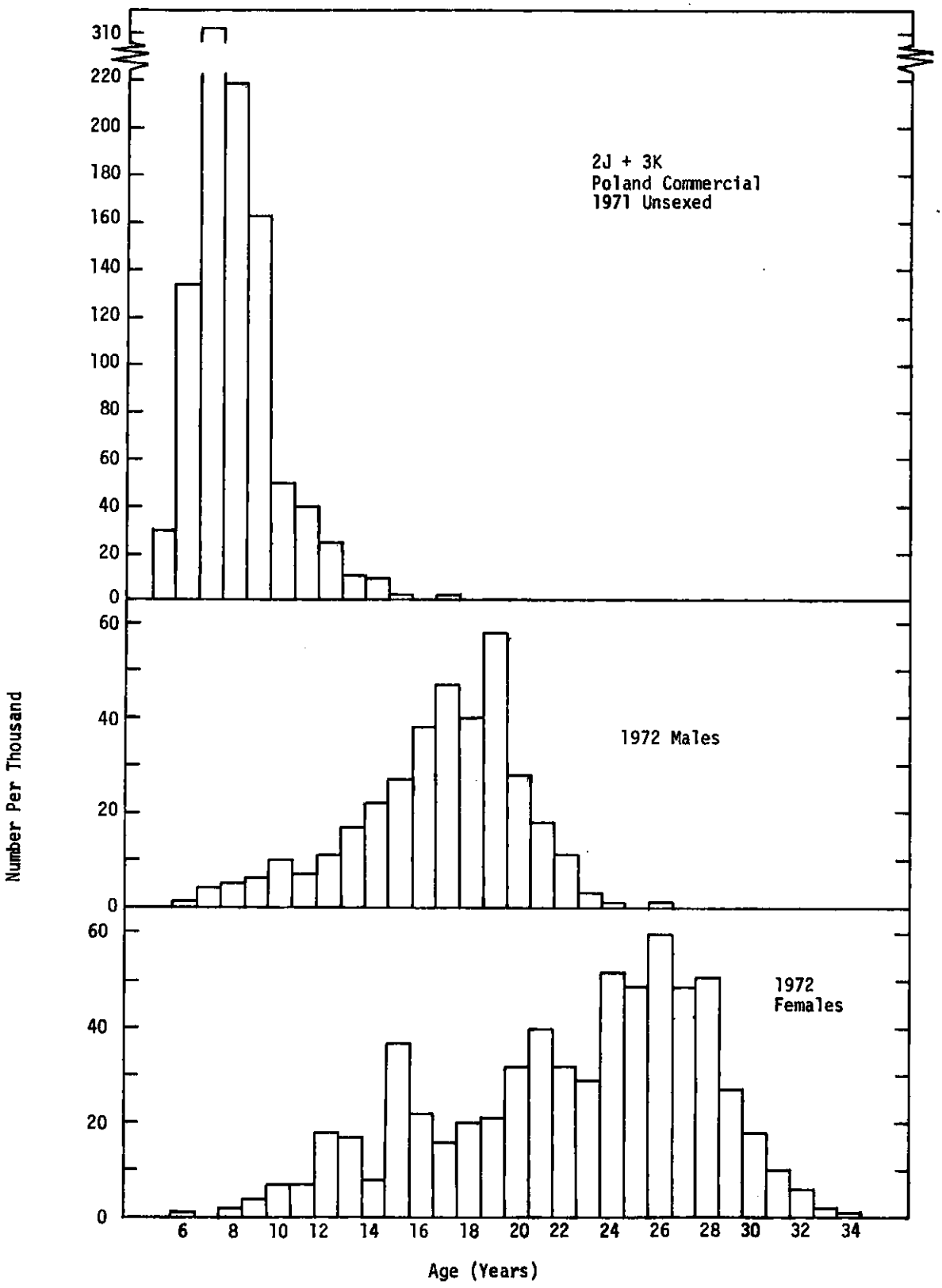


Fig. 3. Age distributions of Polish samples of 1971 and 1972 commercial redfish catches in Divisions 2J-3K.

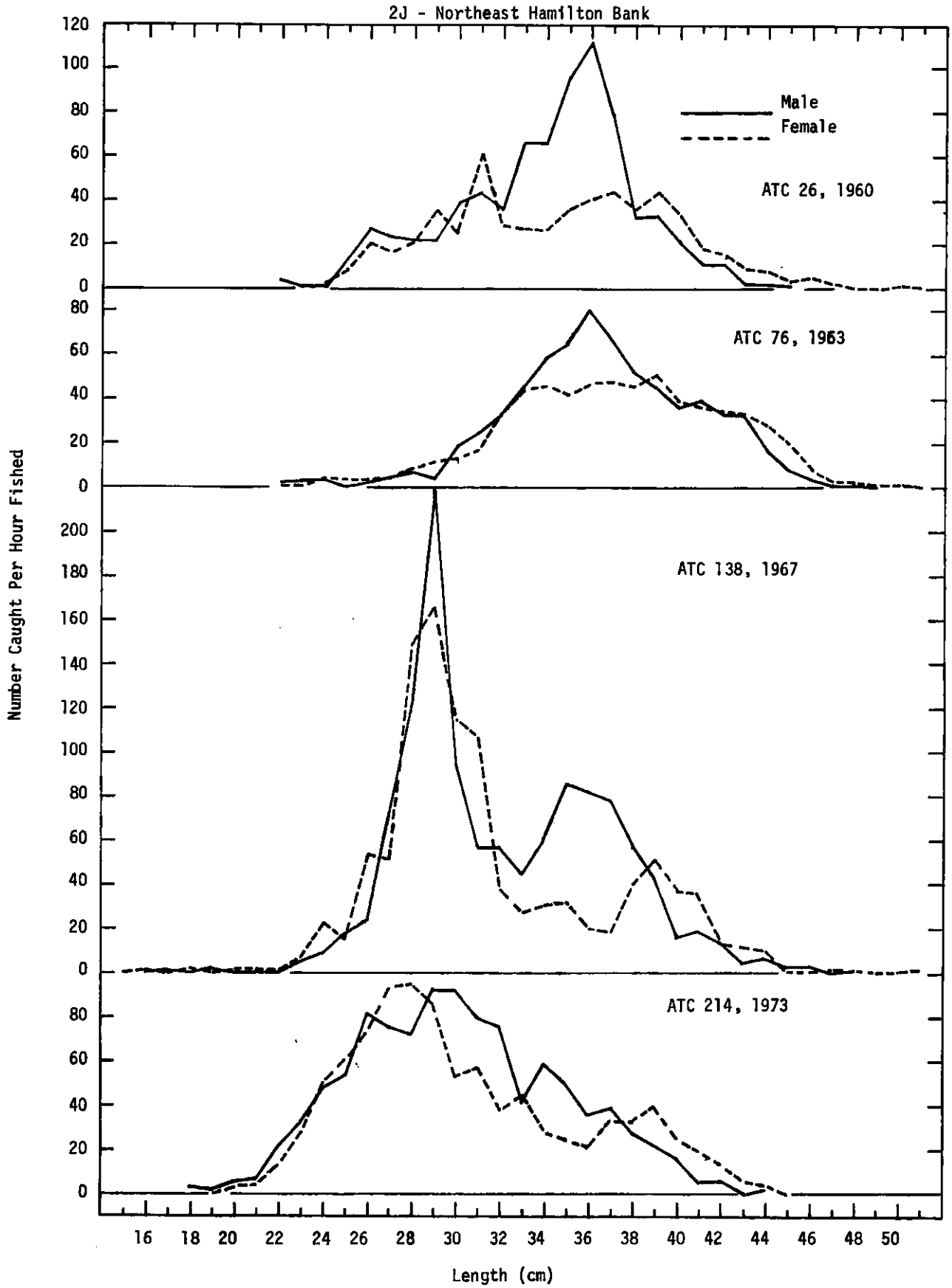


Fig. 4. Length distributions of research catches of redfish by the A. T. Cameron on the northeast edge of Hamilton Inlet Bank, 1960-73.

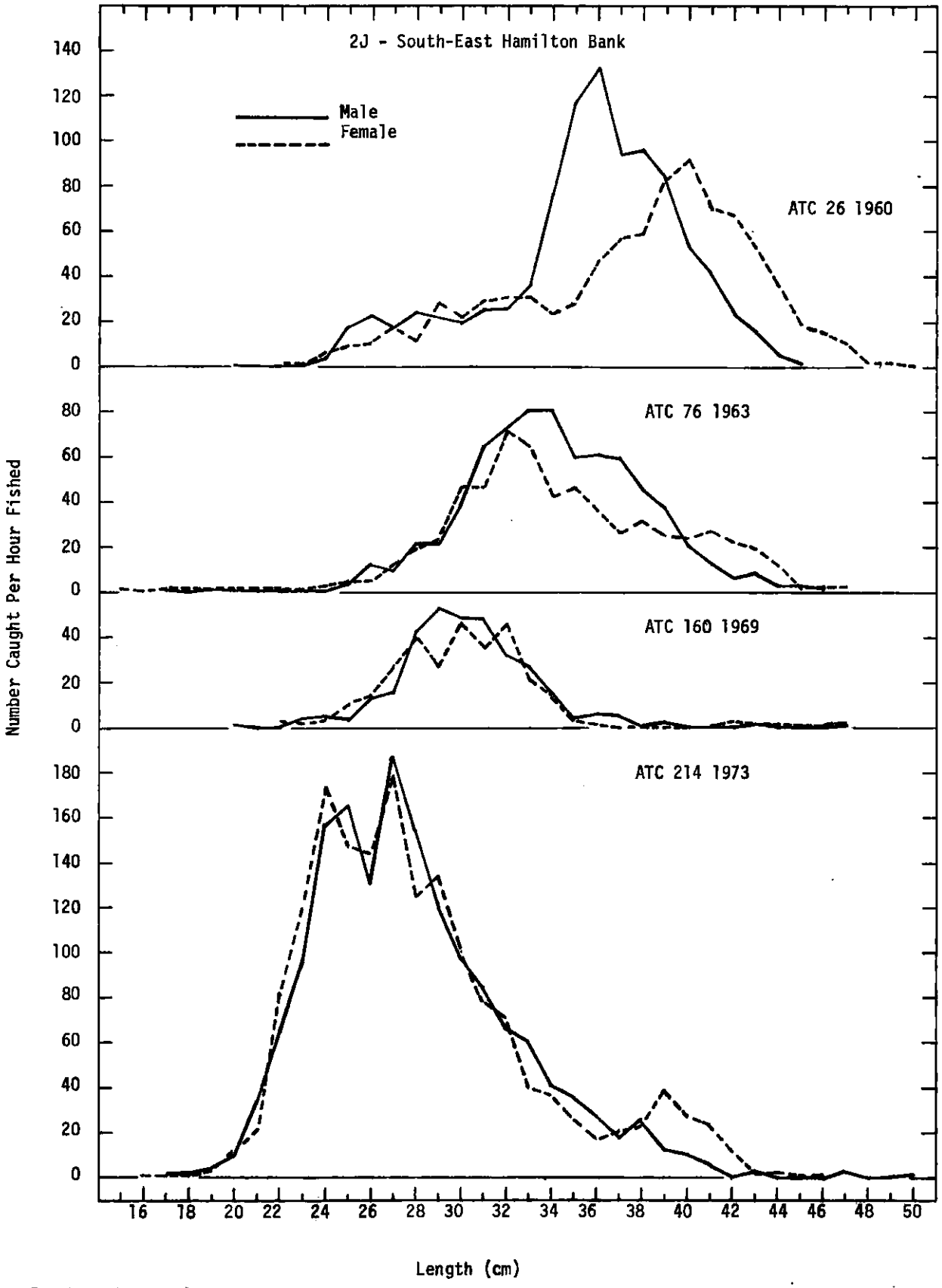


Fig. 5. Length distributions of research catches of redfish by the A. T. Cameron on the southeast edge of Hamilton Inlet Bank, 1960-73.

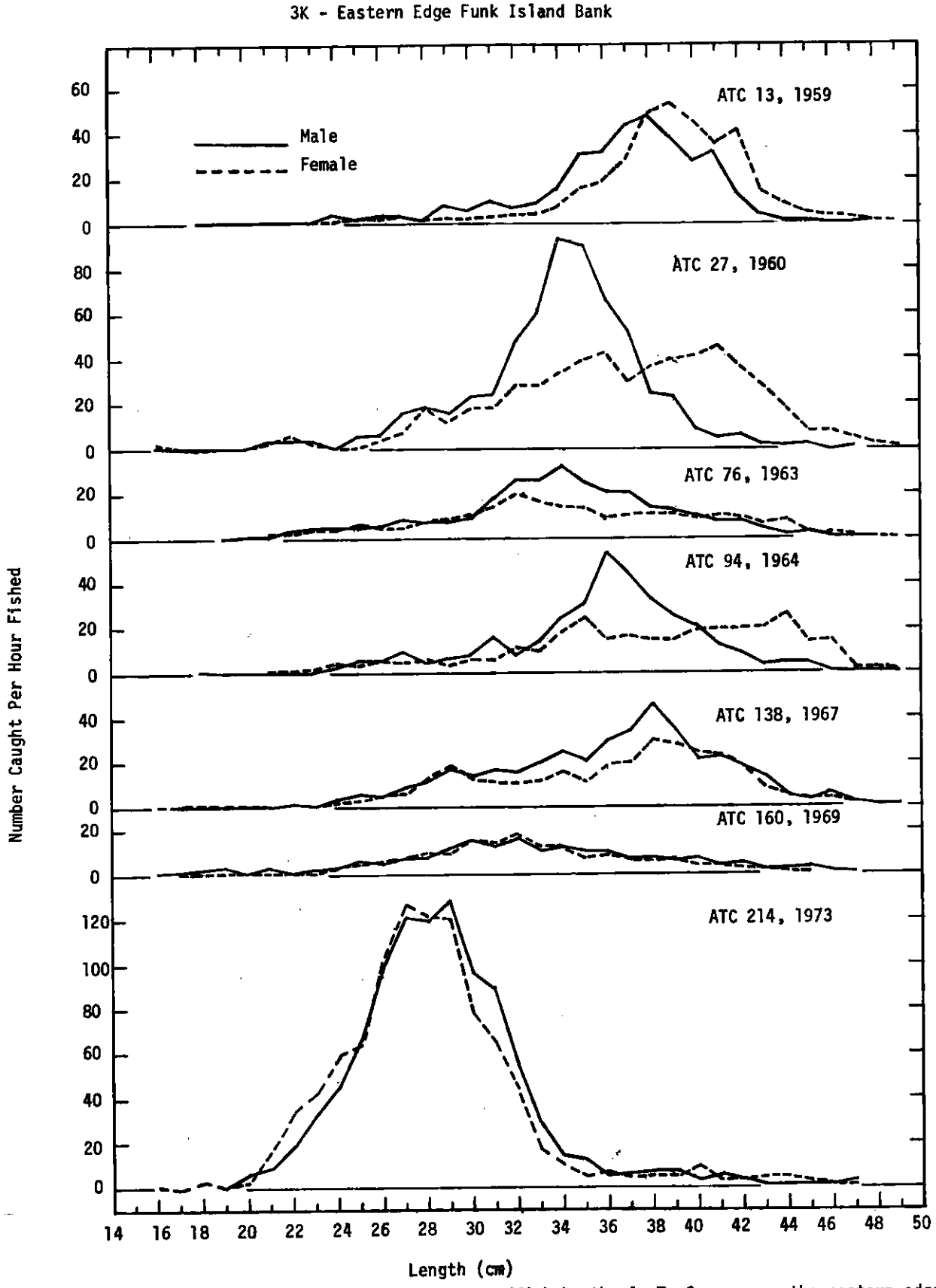


Fig. 6. Length distributions of research catches of redfish by the A. T. Cameron on the eastern edge of Funk Island Bank, 1959-73.

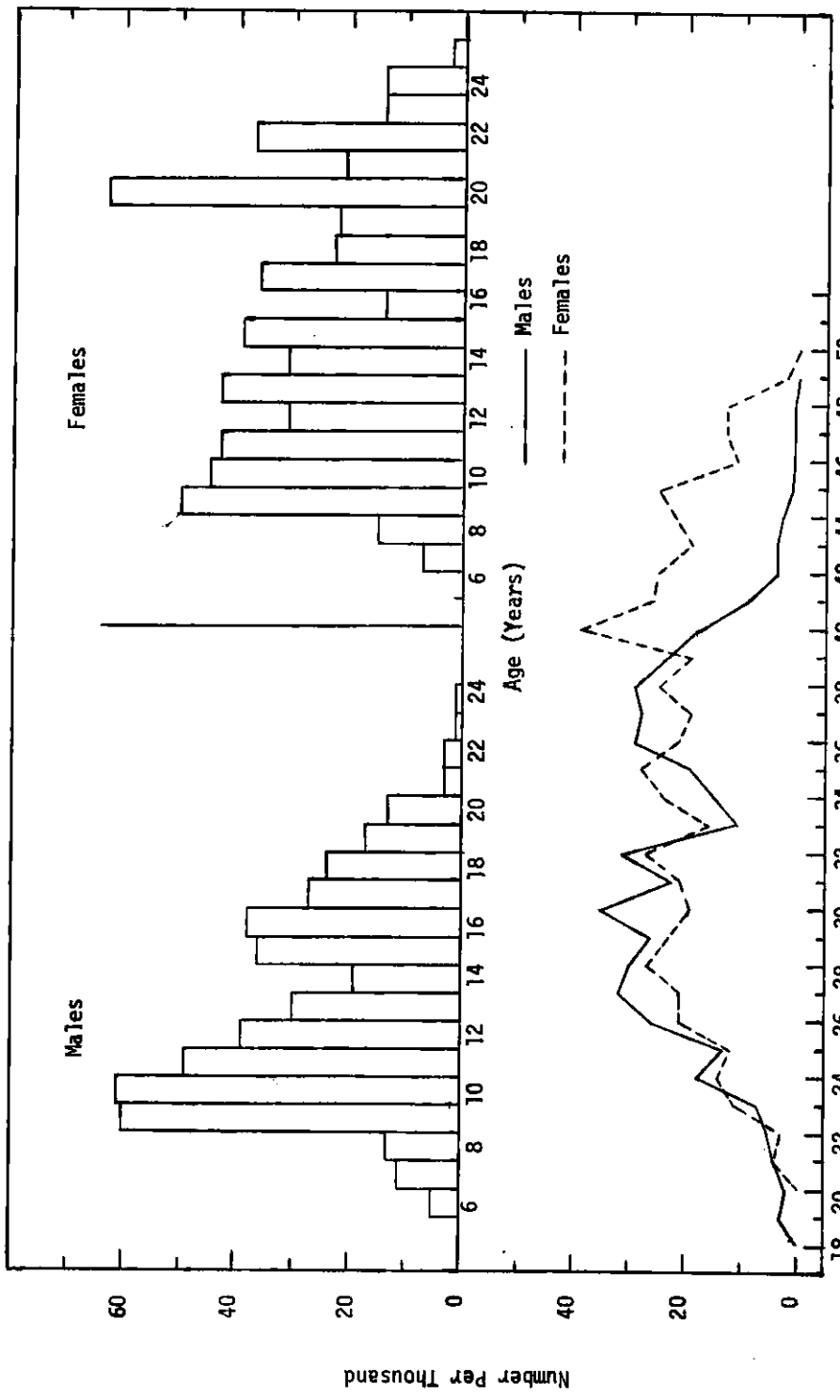


Fig. 7. Length and age distributions of 1973 USSR research catches of redfish in Division 3K.

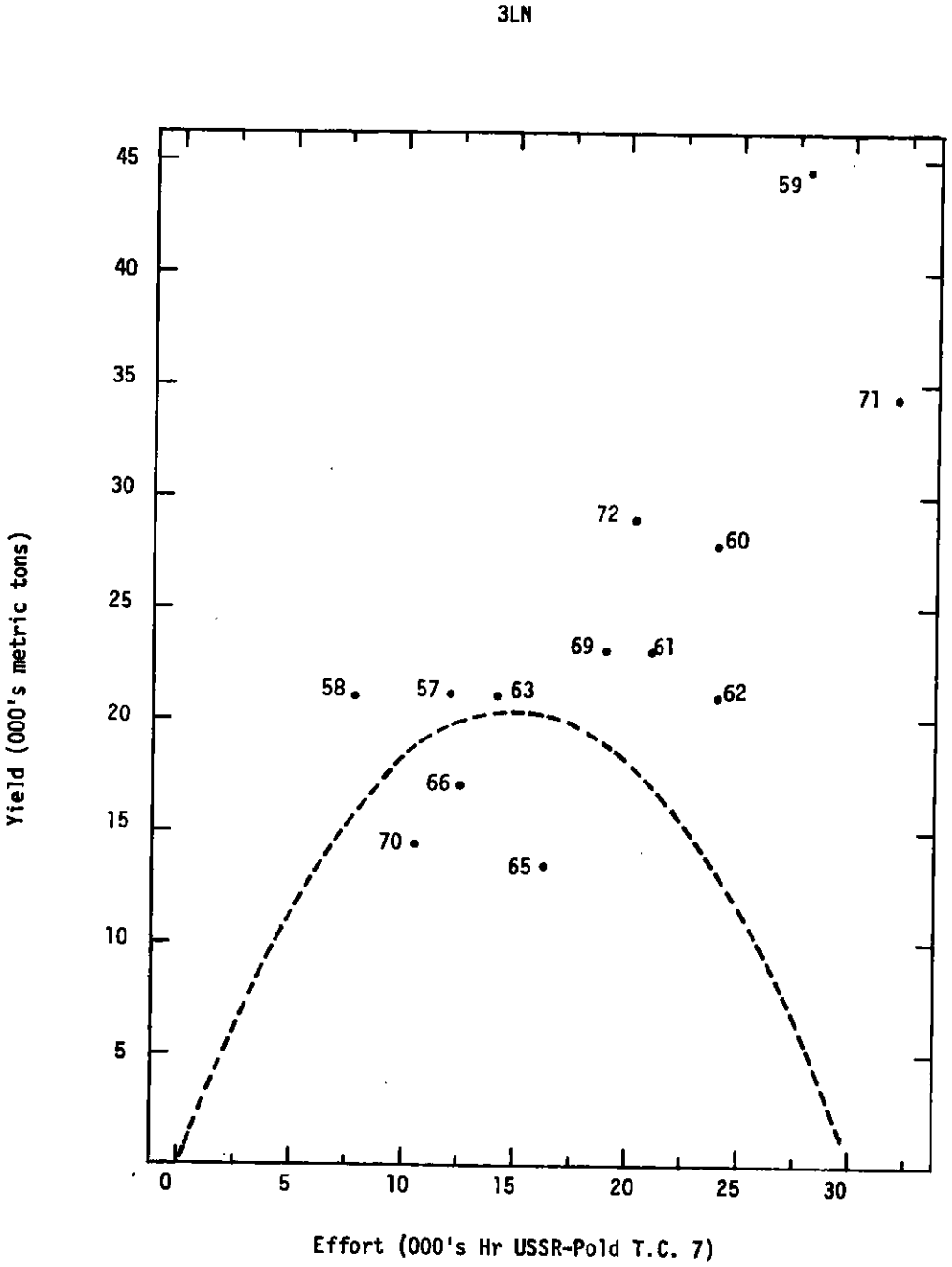


Fig. 8. General production yield curve for Divisions 3L-N redfish (from Parsons and Parsons, MS 1973, with 1972 added).

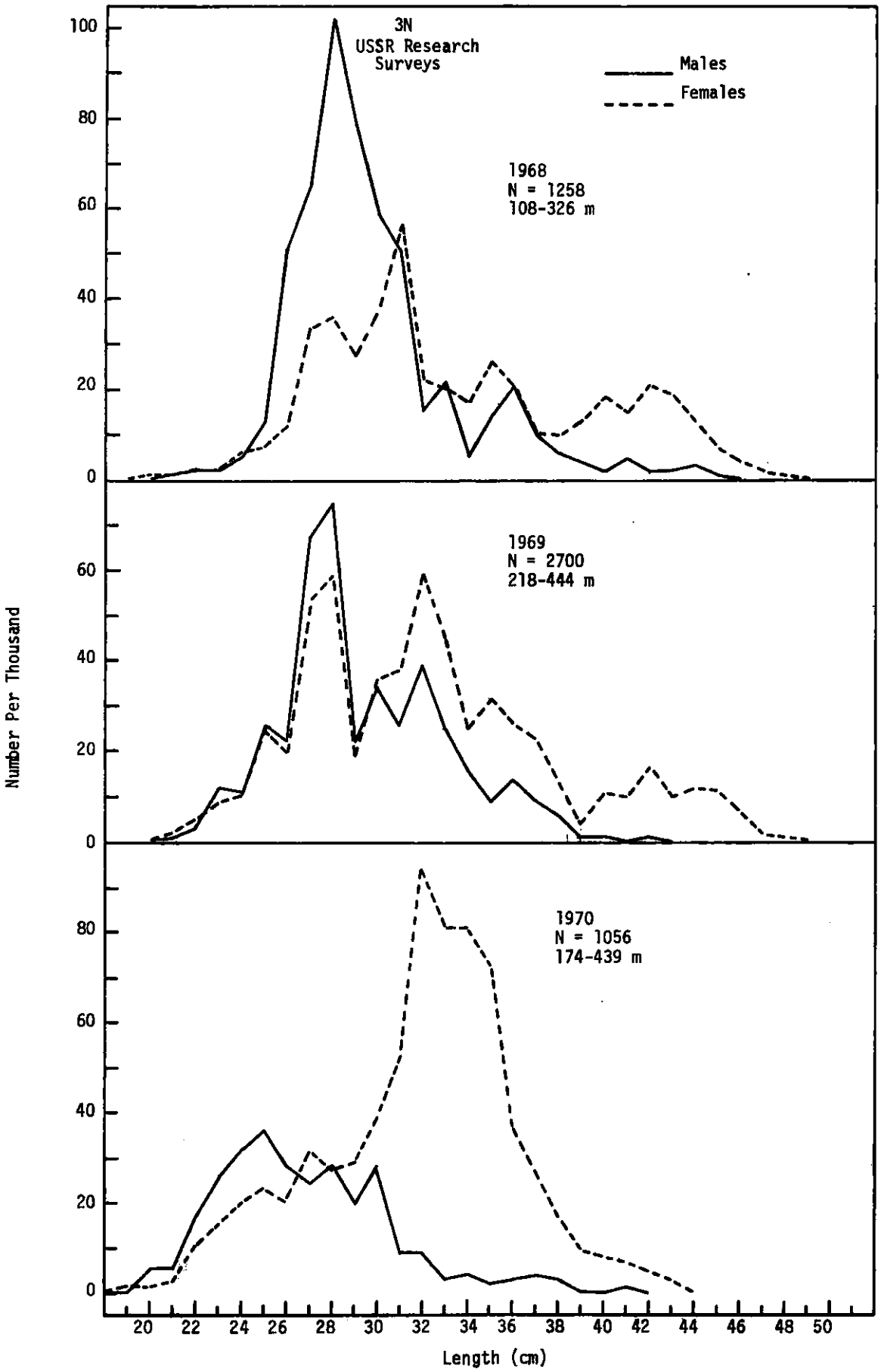


Fig. 9. Length distributions of USSR research catches of redfish in Division 3N, 1968-70.

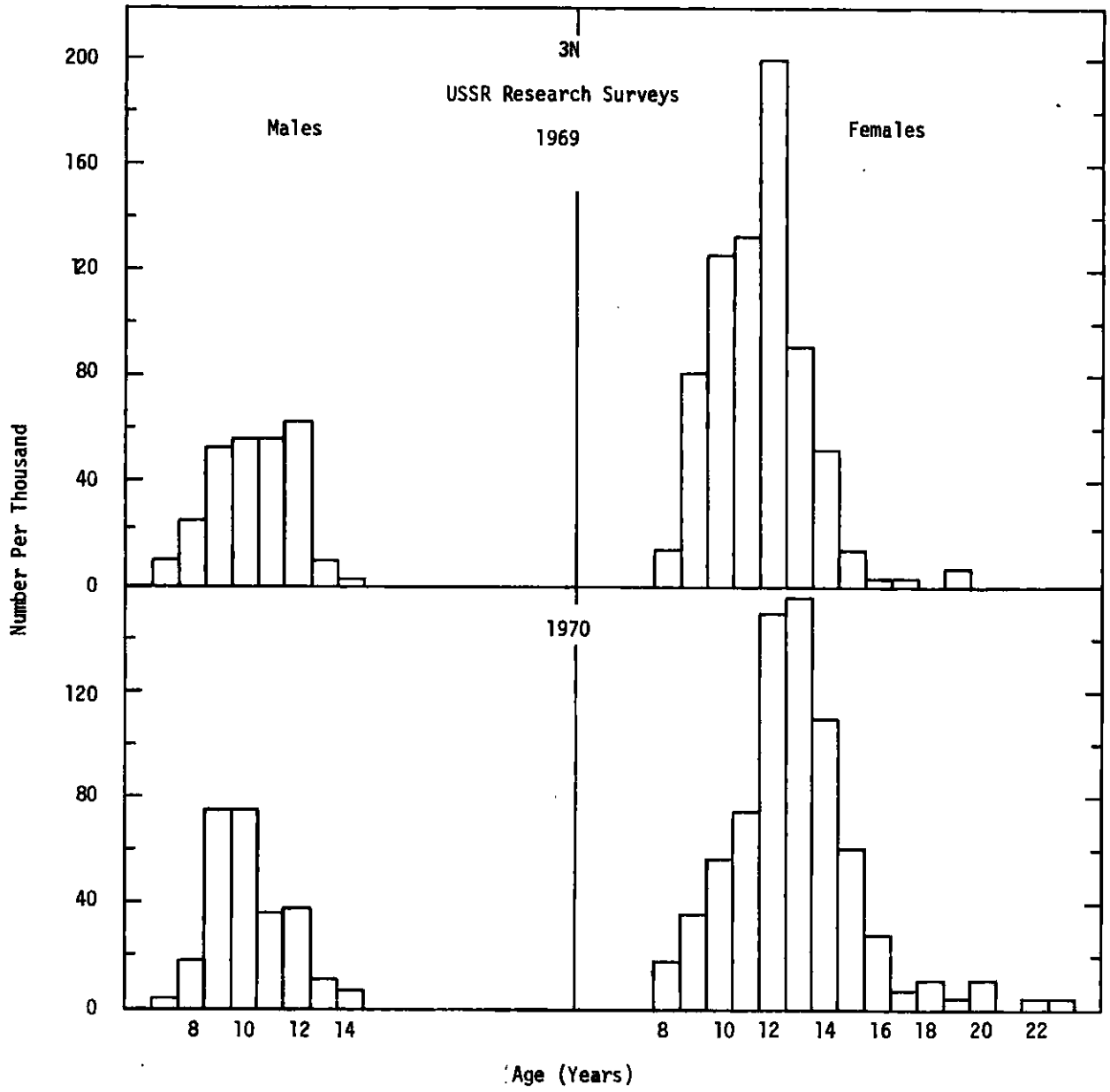


Fig. 10. Age distributions of USSR research catches of redfish in Division 3N, 1969 and 1970.

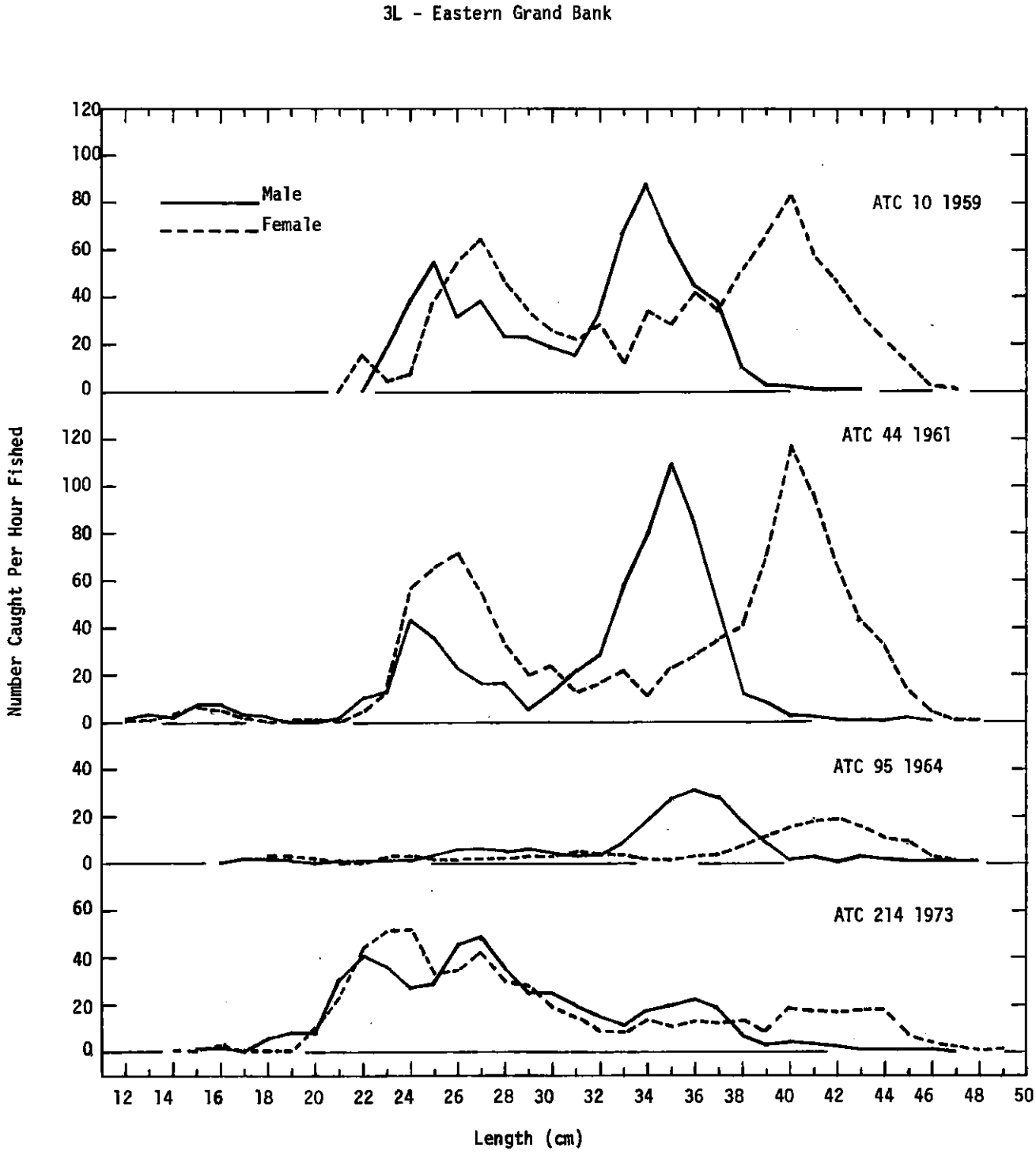


Fig. 11. Length distributions of research catches of redfish by the A. T. Cameron on the eastern edge of the Grand Bank, 1959-73.

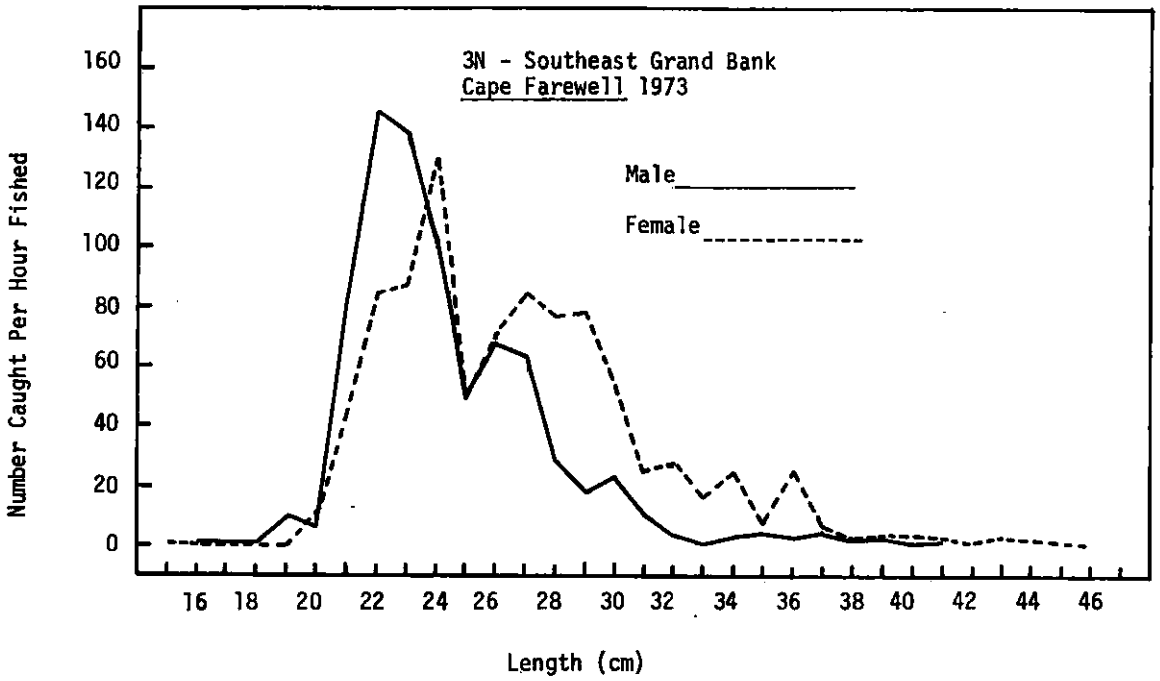


Fig. 12. Length distribution of redfish caught by the Cape Farewell during 1973 exploratory fishing in Division 3N.

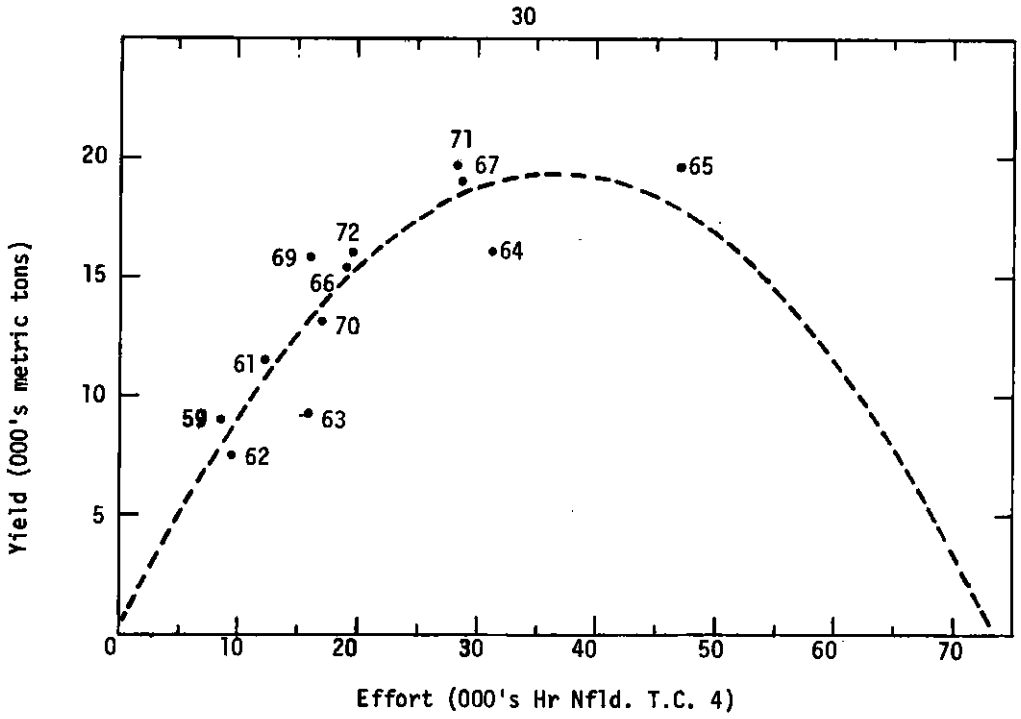
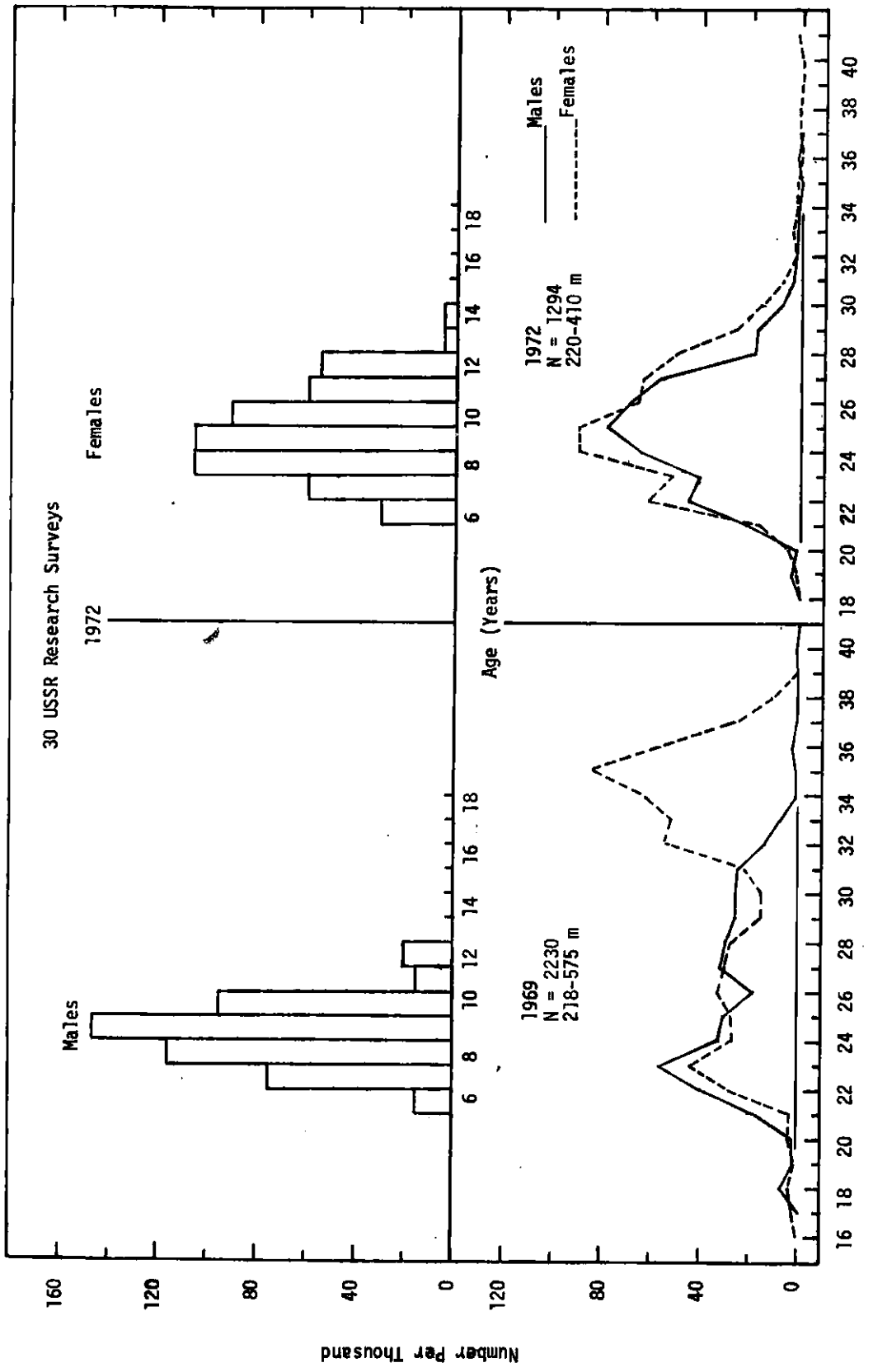


Fig. 13. General production yield curve for Division 3O redfish from a simplified application of the Schaefer model (from Parsons and Parsons, MS 1973, with 1972 added).



F 3

Fig. 14. Length and age distributions of 1969 and 1972 USSR research catches of redfish in Division 30.