

OVERALL FISHING INTENSITY AND CATCH BY LENGTH CLASS OF ALBACORE IN JAPANESE
ATLANTIC LONGLINE FISHERY, 1956-1971 *

by

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SUMMARY

Catch and length data for 1971 were added to previous calculations for albacore taken by Japanese and other longline fleets (Shiohama 1973). For the north and south populations, the fishing intensity in 1971 appears to have reached so high a level that a further increase in effort may not result in a substantial increase in yield. Length samples show no drastic change in the composition of catch from immature stocks of the northern population.

* Data to be partially reproduced in Data Record, Vol. 4

RESUME

Des données de capture et d'échantillonnage pour 1971 ont été incorporées aux calculs antérieurs concernant le germon capturé par la flottille japonaise et autres flottilles palangrières (Shiohama, 1973). En ce qui concerne les populations du nord et du sud, l'intensité de pêche semble avoir atteint en 1971 un niveau tellement élevé qu'un accroissement ultérieur de l'effort pourrait ne pas entraîner d'augmentation sensible du rendement. Les échantillons de longueur n'indiquent pas de changements brusques dans la composition des prises provenant des stocks juvéniles de la population du nord.

* Ces données seront partiellement reproduites dans le Recueil de Données Statistiques, Vol. 4.

RESUMEN

Los datos de capturas y tallas de 1971 fueron añadidos a los cálculos anteriores sobre albacora capturada por la flota japonesa y otras flotas palangreras (Shiohama 1973). En las poblaciones del Norte y del Sur, la intensidad pesquera en 1971 parece haber alcanzado un nivel tan alto que un nuevo aumento del esfuerzo podría no repercutir favorablemente en la producción. Las muestras de tallas no reflejan un cambio drástico en la composición de la captura de los stocks inmaduros de la población del Norte.

* Estos datos serán parcialmente reproducidos en la "Colección de Datos Estadísticos" Vol. 4.

The present paper provides overall fishing intensity in 1956 to 1971 and catch by length class in 1971 of albacore taken by longline fishery in the North and South Atlantic Ocean.

1. Fishing intensity

1.1 Materials and methods

In addition to data described in the first issue of this series (Shiohama 1973), two volumes of statistics for 1971, Fishery Agency of Japan (1973) and ICCAT (1973), are included. "Average years" extend during six years from 1966 to 1971.

In analysing these data, the Atlantic Ocean is divided into four subareas corresponding to major habitats of adult and immature stocks of the North and South populations seemingly delimited by the South Equatorial Current (Fig. 1). Calculating the formulae, the two populations were regarded to be independent with each other.

Some explanation may be necessary on estimation of yield by population. The procedures are determined by nationals, that differ with each other in mode of operation and type of available statistics.

a. Japanese yield: The Task 2 statistics provide catch in terms of number by subarea. A preliminary estimate of yield for i -th subarea, \underline{Y}_i' , is based on catch in number in the subarea, \underline{C}_i , and average body weight, \underline{w}_i , surmised from length composition as 22 kg in N-1 and S-1, 15 kg in N-2 and 14 kg in S-2. Actual variation in average body weight and other sources make the preliminary estimates in the four subareas not adding up to the total Japanese yield given in the ICCAT Statistical Bulletin, \underline{Y} . The final estimate of yield for i -th subarea, \underline{Y}_i , is obtained based on the total yield and preliminary areal yield, $\underline{Y}_i' = \underline{w}_i \times \underline{C}_i$.

$$\underline{Y}_i = \underline{Y} \times \underline{Y}_i' / \sum_i \underline{Y}_i'$$

b. Korean yield: It is reasonably assumed that the Korean boats exploited only the South population in 1964 and 1965 at their beginning of exploitation. A sampling survey for 1966 to 1969 (Korean Office of Fisheries 1970) indicates northward extension of the fishing activity. Yields from the North and South populations in these four years, \underline{Y}_i 's, are obtained by multiplying the total yearly yield, \underline{Y} , and ratios of number of operations, \underline{g}_i , in the respective distribution range.

$$\underline{Y}_i = \underline{Y} \times \underline{g}_i / \sum_i \underline{g}_i$$

Distribution of Korean yield in 1970 and 1971 is assumed to have been the same with that of Taiwanese yield in respective years.

c. Taiwanese yield: The yield might have exclusively come from the South population in 1965 and 1966 when the Taiwanese fleet comprised only two boats seemingly to have operated basing on Monrovia (Federation of Japan Tuna Fisheries Co-operative Associations & Japan Tuna Fisheries Federation 1967).

1967). Taiwanese Fisheries Bureau (1968-1970) published areal yields of sample boats operated in 1967 to 1969. A similar series of data was made available for 1971. These data show that yields from the North population comprised 41.8 percent in 1967, 20.2 percent in 1968, 16.7 percent in 1969 and 14.5 percent in 1971. The figure of 1970 is assumed to be 15.6 percent averaging the figures for 1969 and 1971. These percentages divide the annual total yields into those from the North and South populations.

d. Brazilian and Argentinean yields: The yields are assumed to have come from the South population distributed in the adjacent waters to these countries.

e. Panamanian and Venezuelan yields: The yields are assumed to have come from the North population distributed in the adjacent waters to these countries. Although some Panamanian boats operate together with Korean boats, errors due to the above assumption may not be significant because of limited amount of the Panamanian yield.

1.2 Results

Appendix tables 1 and 2 present monthly area of distribution range of fish, and amount of effective fishing effort and overall fishing intensity calculated by year and by month for each of the North and South populations in Japanese longline fishery. Tables 1 and 2 give summarized numerals inclusive of average hook rate (= annual catch/annual sum of effective effort), catch in number and yield in weight, and overall fishing intensity in Japanese fleet together with the latter three numerals surmised for the whole longline fleet.

1.2.1 North population

Hook rate decreased gradually from 1.9 percent to 1.3 percent while Japanese intensity increased from 178,000 hooks per 5-degree square in 1962 to 531,900 to 589,100 hooks in 1964 and 1965. Further steady decrease of the hook rate was accompanied with irregular fluctuation in Japanese intensity between 134,300 and 421,500 hooks. In 1971, the lowest rate of 1.1 percent was observed. It is to be noted that yield of non-Japanese boats increased since 1966, and comprised nearly a half of total in 1971 (Table 1).

Overall fishing intensity surmised for the whole fleet showed a decrease until 1969 but increased rapidly in 1970 and 1971. Catch stayed around 6,000,000 fish for the fishing intensity over 600,000 hooks per 5-degree square. Expansion of fishing activity for the immatures appears to decline the yield from around 15,000 tons in three years between 1963 and 1965 to around 10,000 tons in 1970 and 1971 (Fig. 2).

1.2.2 South population

Japanese intensity increased rapidly from 110,000 hooks per 5-degree square in 1961 to 675,700 hooks in 1966, and then decreased drastically to 153,800 hooks in 1971. Hook rate stayed around 5 percent in 1957 to 1961, but dropped gradually since then as low as 2.3 percent in 1966 and below 2 percent in 1969 and onward. During the 16 years, Japanese share in yield decreased steadily as 100 percent up to 1958, 79 percent in 1966 and only 12 percent in 1971 (Table 2).

In spite of steady increase of fishing intensity of the whole longline fleet inclusive of non-Japanese boats, exceeding 500,000 hooks per 5-degree

square in 1964 and 1,200,000 hooks in 1970, the yield did not show substantial increase over 28,000 tons since 1964. Slight increase in catch after 1963 reflects expansion of fishing activity on immatures in S-2 subarea (Fig. 3).

2. Catch by length class

Procedures of calculations were already given in the first issue of this series. In 1971, 3,740 albacore were measured, and 3,653 of them come from catch in N-2 subarea during the third and fourth quarters, July through December (Shingu and Hisada ms). For the remaining catch with poor samples, data taken in preceding years were substituted (Table 3).

Appendix table 3 gives number of albacore in 1-cm interval of body length taken by Japanese longline fishery in the year. The fish taken in N-2 subarea extend between 59 and 116 cm in body length, with major mode of around 84 cm (Fig. 4). A similar frequency distribution appeared in 1966 when fairly good sampling was conducted (Shiohama 1973).

3. Urgent survey activity

In order to define the North and South populations, it is necessary to expand length sampling, and, if possible, to initiate more advanced studies including tagging experiment and morphological survey. Furthermore, recent expansion of variations in species preference by commercial boats requires collection of non-Japanese Task 2 statistics for obtaining reliable estimates of fishing intensity.

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Table 1. Hook rate, catch in number, yield in weight and overall fishing intensity of albacore in Japanese longline fishery, and catch, yield and overall fishing intensity in the whole longline in the North Atlantic Ocean, 1956-1971.

| Year | Hook rate in percent | Japanese fleet | | | Whole fleet | | |
|------|----------------------------|-----------------------|------------------|--|-----------------------|-----------------------|--|
| | | Catch in 1000 fish | Yield in tons | Intensity in 1,000 hooks per 5 ⁰ square | Catch in 1000 fish | Yield in 1000 tons | Intensity in 1,000 hooks per 5 ⁰ square |
| 1956 | 1.20 | 0 | 2 | 0.1 | 0 | 0.0 | 0.1 |
| 1957 | 3.78 | 5 | 135 | 1.7 | 5 | 0.1 | 1.7 |
| 1958 | 4.03 | 47 | 946 | 15.4 | 47 | 0.9 | 15.4 |
| 1959 | 3.06 | 59 | 600 | 26.7 | 59 | 0.6 | 26.7 |
| 1960 | 3.25 | 52 | 1,127 | 21.6 | 52 | 1.1 | 21.6 |
| 1961 | 2.13 | 18 | 380 | 10.4 | 18 | 0.4 | 10.4 |
| 1962 | 1.91 | 280 | 5,703 | 178.0 | 280 | 5.7 | 178.0 |
| 1963 | 1.94 | 545 | 14,488 | 330.9 | 545 | 14.5 | 330.9 |
| 1964 | 1.72 | 836 | 15,792 | 589.1 | 836 | 15.8 | 589.1 |
| 1965 | 1.32 | 555 | 14,341 | 531.9 | 555 | 14.3 | 531.9 |
| 1966 | 1.54 | 318 | 5,861 | 274.1 | 431 | 8.0 | 371.7 |
| 1967 | 1.66 | 251 | 4,775 | 207.9 | 643 | 12.3 | 532.7 |
| 1968 | 1.58 | 177 | 3,301 | 151.5 | 306 | 5.7 | 261.7 |
| 1969 | 1.47 | 146 | 4,720 | 134.3 | 230 | 7.4 | 211.5 |
| 1970 | 1.51 | 357 | 5,878 | 322.3 | 599 | 9.9 | 540.8 |
| 1971 | 1.10 | 333 | 6,477 | 421.5 | 605 | 11.8 | 765.2 |

Table 2. Hook rate, catch in number, yield in weight and overall fishing intensity of albacore in Japanese longline fishery, and catch, yield and overall fishing intensity in the whole longline fishery, operated in the South Atlantic Ocean, 1956-1971.

| Year | Hook rate in percent | Japanese fleet | | | Whole fleet | | |
|------|----------------------------|------------------------|------------------|--|------------------------|------------------------|--|
| | | Catch in 1,000 fish | Yield in tons | Intensity in 1,000 hooks per 5 ⁰ square | Catch in 1,000 fish | Yield in 1,000 tons | Intensity in 1,000 hooks per 5 ⁰ square |
| 1956 | 1.36 | 1 | 21 | 0.9 | 1 | 0.0 | 0.9 |
| 1957 | 4.67 | 27 | 725 | 6.7 | 27 | 0.7 | 6.7 |
| 1958 | 4.96 | 52 | 1,046 | 12.4 | 52 | 1.0 | 12.4 |
| 1959 | 6.07 | 298 | 3,014 | 52.6 | 467 | 4.7 | 82.4 |
| 1960 | 5.28 | 400 | 8,677 | 80.1 | 483 | 10.5 | 96.7 |
| 1961 | 4.22 | 413 | 8,893 | 110.0 | 483 | 10.4 | 128.5 |
| 1962 | 2.83 | 827 | 16,434 | 310.3 | 862 | 17.1 | 323.5 |
| 1963 | 3.16 | 589 | 15,203 | 207.4 | 647 | 16.7 | 227.9 |
| 1964 | 3.07 | 1,298 | 23,658 | 465.2 | 1,397 | 25.5 | 500.5 |
| 1965 | 2.48 | 1,214 | 28,292 | 583.3 | 1,287 | 30.0 | 618.4 |
| 1966 | 2.30 | 1,268 | 21,022 | 675.7 | 1,606 | 26.6 | 855.9 |
| 1967 | 2.38 | 437 | 7,715 | 215.8 | 1,657 | 29.2 | 818.4 |
| 1968 | 2.48 | 739 | 11,862 | 372.8 | 1,695 | 27.3 | 855.2 |
| 1969 | 1.86 | 244 | 6,328 | 162.0 | 1,251 | 32.3 | 830.6 |
| 1970 | 1.98 | 454 | 5,894 | 293.7 | 1,908 | 24.8 | 1,254.5 |
| 1971 | 1.81 | 218 | 3,636 | 153.8 | 1,835 | 30.3 | 1,294.5 |

Table 3. sample size and substitution of data for calculating catch by length class, 1971.

Numerals in parentheses denote substitutions of data.

- (1) Roman numerals: Substituted data of the given quarter.
 (2) Arabic numerals: substituted data of the given quarter.

| Area | Quarter | | | |
|------|--------------|---------------|---------------|--------------|
| | I | II | III | IV |
| N-2 | (III, 1971) | (III, 1971) | 817 | 2836 |
| N-1 | 9+(IV, 1971) | (I, IV, 1971) | (I, IV, 1971) | 68+(I, 1971) |
| S-1 | (IV, 1968) | (IV, 1968) | (IV, 1968) | (IV, 1968) |
| S-2 | (I, 1970) | (II, 1970) | (II, 1970) | (IV, 1969) |

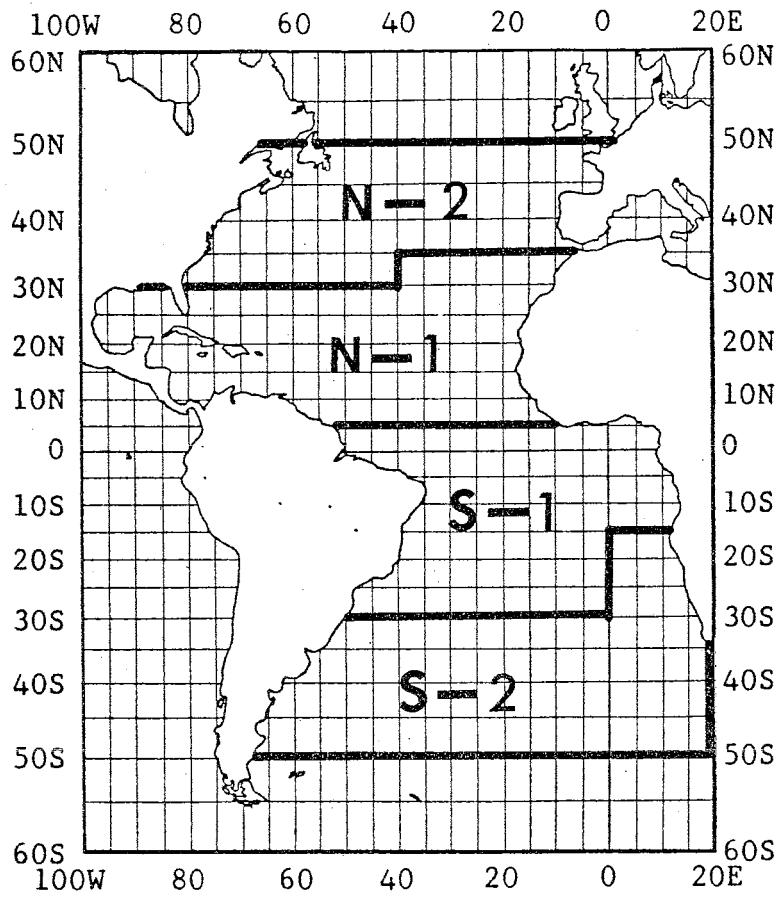


Fig. 1. Definition and division of the Atlantic Ocean for calculating amount of fishing effort and catch by length class of albacore in Japanese longline fishery, 1956-1971.

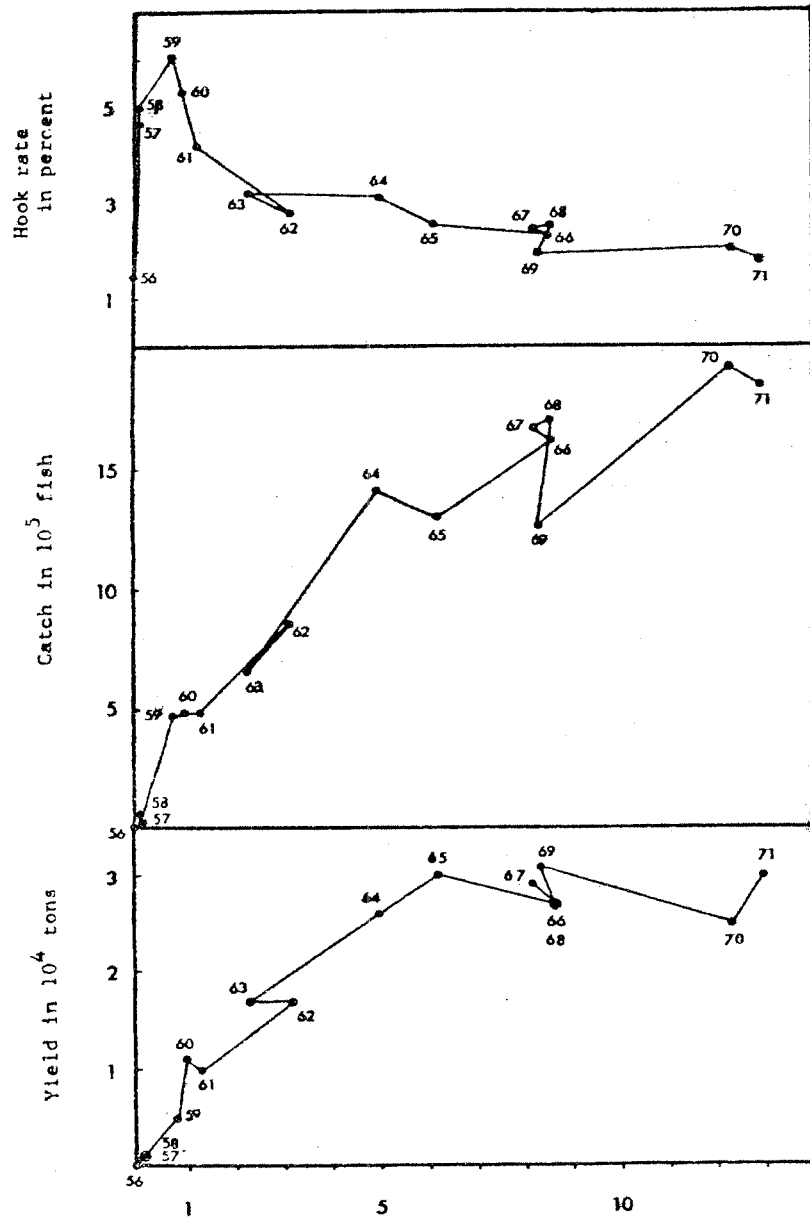


Fig. 2. Hook rate, catch and yield of albacore against overall fishing intensity in the North Atlantic longline fishery, 1956-1971.

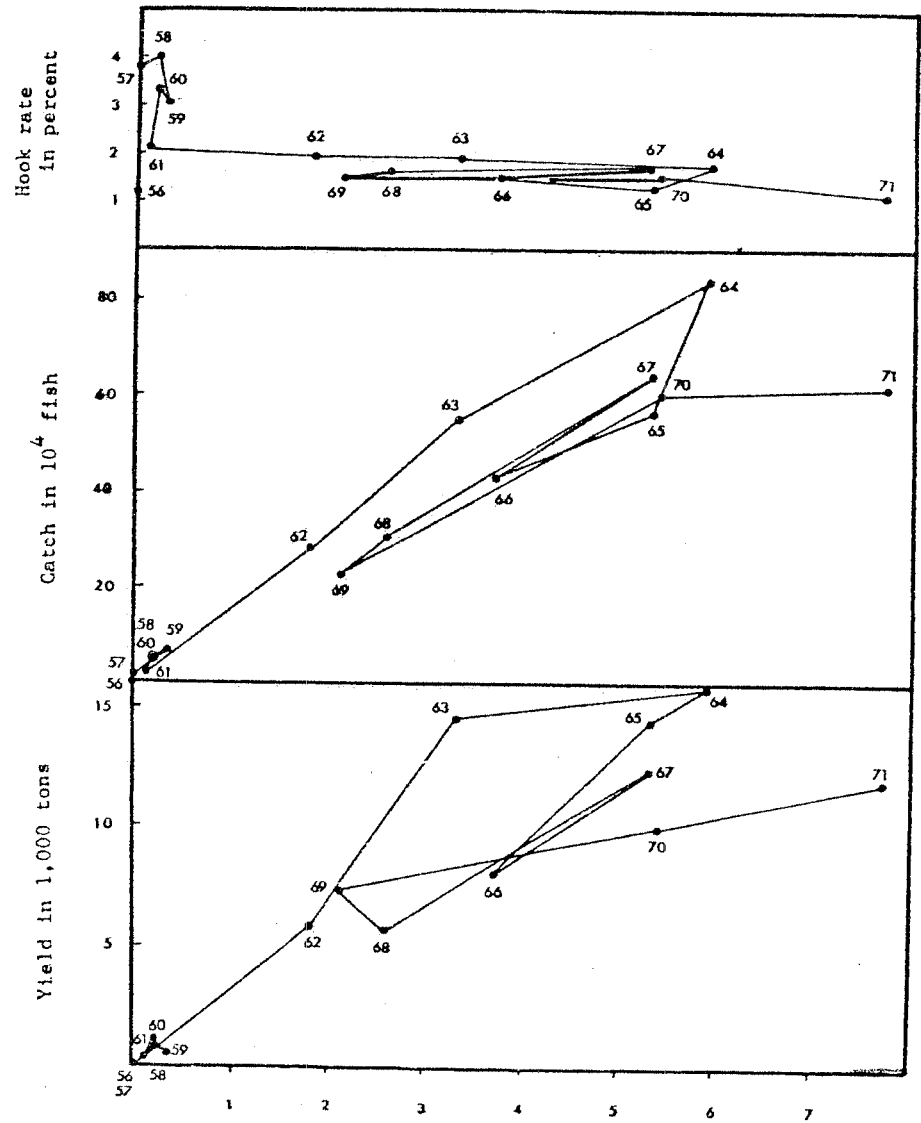


Fig. 3. Hook rate, catch and yield of albacore against overall fishing intensity in the South Atlantic longline fishery, 1956-1971.

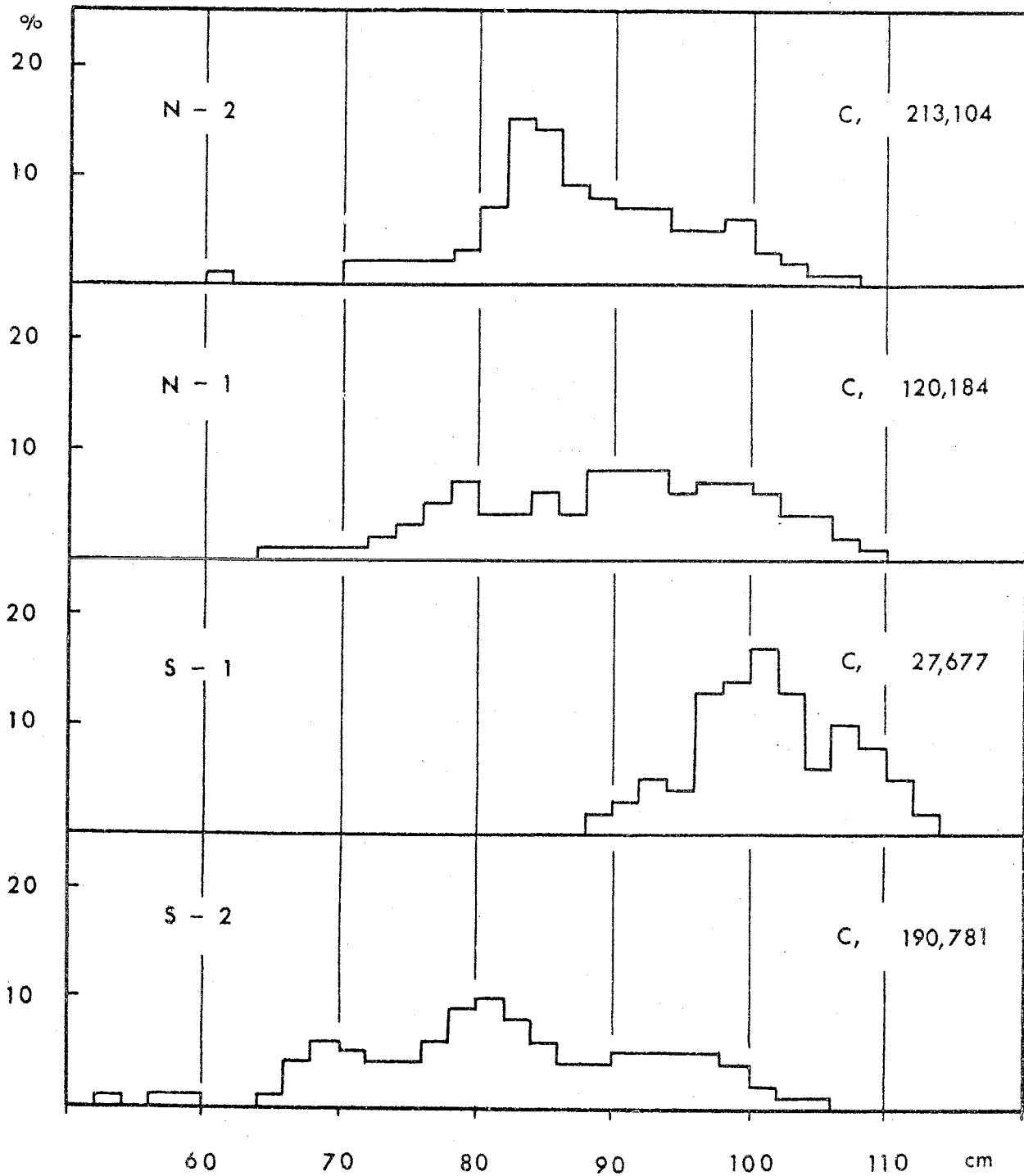


Fig. 4. Percentage length composition of albacore caught by Japanese longline fishery in the Atlantic Ocean, 1971. See fig. 1 for division of area.

Appendix table 1. Extent of distribution range of the North population of albacore in 5-degree square in the average years, and amount of effective effort in thousand hooks and overall fishing intensity in thousand hooks per 5-degree square of Japanese longline fishery, 1956-1971.

A. N-1 subarea for adult stock.

| Month | Area | 1956 | | 1957 | | 1958 | | 1959 | | 1960 | |
|-------|--------|------|-----|------|-----|-------|------|-------|------|-------|------|
| | | x | f | x | f | x | f | x | f | x | f |
| Total | 642.05 | 9 | 0.1 | 131 | 2.4 | 1,173 | 21.6 | 1,929 | 37.2 | 1,605 | 29.9 |
| 1 | 52.03 | 0 | 0 | 0 | 0 | 6 | 0.1 | 148 | 2.8 | 73 | 1.4 |
| 2 | 51.04 | 0 | 0 | 0 | 0 | 0 | 0 | 88 | 1.7 | 16 | 0.3 |
| 3 | 46.04 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 0.4 | 5 | 0.1 |
| 4 | 54.52 | 0 | 0 | 0 | 0 | 0 | 0 | 67 | 1.2 | 20 | 0.4 |
| 5 | 67.17 | 0 | 0 | 0 | 0 | 120 | 1.8 | 78 | 1.2 | 37 | 0.6 |
| 6 | 65.59 | 4 | 0.1 | 17 | 0.3 | 307 | 4.7 | 406 | 6.2 | 155 | 2.4 |
| 7 | 58.73 | 0 | 0 | 8 | 0.1 | 147 | 2.5 | 167 | 2.8 | 147 | 2.5 |
| 8 | 58.65 | 1 | 0.0 | 56 | 1.0 | 52 | 0.9 | 50 | 0.9 | 391 | 6.7 |
| 9 | 50.93 | 1 | 0.0 | 8 | 0.2 | 127 | 2.5 | 73 | 1.4 | 279 | 5.5 |
| 10 | 51.86 | 3 | 0.1 | 34 | 0.7 | 178 | 3.4 | 188 | 3.6 | 335 | 6.5 |
| 11 | 38.92 | 0 | 0 | 6 | 0.2 | 140 | 3.6 | 242 | 6.2 | 134 | 3.4 |
| 12 | 46.57 | 0 | 0 | 1 | 0.0 | 97 | 2.1 | 406 | 8.7 | 13 | 0.3 |

| Month | 1961 | | 1962 | | 1963 | | 1964 | | 1965 | | 1966 | |
|-------|------|------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|
| | x | f | x | f | x | f | x | f | x | f | x | f |
| Total | 825 | 14.4 | 14,653 | 247.5 | 26,739 | 433.2 | 43,443 | 708.1 | 26,791 | 446.4 | 10,890 | 181.7 |
| 1 | 42 | 0.8 | 5 | 0.1 | 8 | 0.2 | 190 | 3.7 | 1,011 | 19.4 | 666 | 12.8 |
| 2 | 0 | 0 | 0 | 0 | 27 | 0.5 | 371 | 7.3 | 938 | 18.4 | 242 | 4.7 |
| 3 | 3 | 0.1 | 0 | 0 | 39 | 0.8 | 591 | 12.8 | 628 | 13.6 | 173 | 3.8 |
| 4 | 4 | 0.1 | 66 | 1.2 | 223 | 4.1 | 1,650 | 30.3 | 1,118 | 20.5 | 575 | 10.5 |
| 5 | 47 | 0.7 | 405 | 6.0 | 3,959 | 58.9 | 13,190 | 196.4 | 5,842 | 87.0 | 2,508 | 37.3 |
| 6 | 166 | 2.5 | 2,790 | 42.5 | 12,381 | 188.8 | 12,992 | 198.1 | 8,490 | 129.4 | 3,034 | 46.3 |
| 7 | 212 | 3.6 | 6,203 | 105.6 | 6,644 | 113.1 | 7,884 | 134.2 | 4,482 | 76.3 | 1,670 | 28.4 |
| 8 | 127 | 2.2 | 3,911 | 66.7 | 1,593 | 27.2 | 3,294 | 56.2 | 1,945 | 33.2 | 931 | 15.9 |
| 9 | 99 | 1.9 | 732 | 14.4 | 452 | 8.9 | 1,517 | 29.8 | 649 | 12.7 | 554 | 10.9 |
| 10 | 101 | 2.0 | 454 | 8.7 | 696 | 13.4 | 364 | 7.0 | 544 | 10.5 | 281 | 5.4 |
| 11 | 17 | 0.4 | 88 | 2.3 | 449 | 11.5 | 560 | 14.4 | 176 | 4.5 | 44 | 1.1 |
| 12 | 7 | 0.2 | 0 | 0 | 267 | 5.7 | 839 | 18.0 | 969 | 20.8 | 212 | 4.6 |

| Month | 1967 | | 1968 | | 1969 | | 1970 | | 1971 | |
|-------|-------|-------|-------|-------|-------|-------|--------|-------|--------|-------|
| | x | f | x | f | x | f | x | f | x | f |
| Total | 8,144 | 141.3 | 6,593 | 115.5 | 6,972 | 121.2 | 13,530 | 231.9 | 10,935 | 190.4 |
| 1 | 558 | 10.7 | 453 | 8.7 | 320 | 6.2 | 180 | 3.5 | 729 | 14.0 |
| 2 | 424 | 8.3 | 197 | 3.9 | 601 | 11.8 | 612 | 12.0 | 624 | 12.2 |
| 3 | 228 | 5.0 | 508 | 11.0 | 743 | 16.1 | 871 | 18.9 | 517 | 11.2 |
| 4 | 518 | 9.5 | 295 | 5.4 | 403 | 7.4 | 571 | 10.5 | 897 | 16.4 |
| 5 | 711 | 10.6 | 614 | 9.1 | 1,175 | 17.5 | 1,420 | 21.1 | 1,473 | 21.9 |
| 6 | 1,710 | 26.1 | 1,693 | 25.8 | 1,351 | 20.6 | 3,413 | 52.0 | 2,523 | 38.5 |
| 7 | 1,785 | 30.4 | 1,533 | 26.1 | 1,456 | 24.8 | 3,250 | 55.3 | 1,913 | 32.6 |
| 8 | 1,411 | 24.1 | 479 | 8.2 | 618 | 10.5 | 1,938 | 33.0 | 773 | 13.2 |
| 9 | 206 | 4.1 | 360 | 7.1 | 64 | 1.3 | 762 | 15.0 | 621 | 12.2 |
| 10 | 275 | 5.3 | 183 | 3.5 | 127 | 2.4 | 363 | 7.0 | 336 | 6.5 |
| 11 | 122 | 3.1 | 175 | 4.5 | 51 | 1.3 | 84 | 2.1 | 67 | 1.7 |
| 12 | 193 | 4.2 | 100 | 2.2 | 63 | 1.4 | 66 | 1.4 | 462 | 9.9 |

Appendix table 1. (Continued).

B. N-2 subarea for immature stock.

| Month | Area | 1956 | | 1957 | | 1958 | | 1959 | | 1960 | |
|-------|--------|------|---|------|---|------|---|------|---|------|---|
| | | x | f | x | f | x | f | x | f | x | f |
| Total | 223.32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 15.84 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 14.44 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 9.80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 12.88 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 19.35 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 24.49 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 25.05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 21.89 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 20.08 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 19.59 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 17.98 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 21.93 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Month | 1961 | | 1962 | | 1963 | | 1964 | | 1965 | | 1966 | |
|-------|------|-----|------|-----|-------|------|-------|-------|--------|-------|-------|-------|
| | x | f | x | f | x | f | x | f | x | f | x | f |
| Total | 1 | 0.0 | 35 | 1.8 | 1,355 | 54.5 | 5,078 | 233.3 | 15,296 | 801.9 | 9,814 | 545.2 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,864 | 117.7 | 181 | 11.4 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 125 | 8.6 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 127 | 13.0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 337 | 26.1 | 1,291 | 100.3 | 1,701 | 132.1 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 159 | 8.2 | 4,454 | 230.2 | 1,838 | 59.0 |
| 6 | 0 | 0 | 0 | 0 | 8 | 0.3 | 2,034 | 83.0 | 2,442 | 99.7 | 803 | 32.8 |
| 7 | 0 | 0 | 0 | 0 | 1,268 | 50.6 | 468 | 18.7 | 927 | 37.0 | 253 | 10.1 |
| 8 | 0 | 0 | 0 | 0 | 78 | 3.6 | 249 | 11.4 | 483 | 22.1 | 166 | 7.6 |
| 9 | 1 | 0.0 | 0 | 0 | 0 | 0 | 100 | 5.0 | 191 | 9.5 | 382 | 19.0 |
| 10 | 0 | 0 | 35 | 1.8 | 0 | 0 | 0 | 0 | 737 | 37.6 | 1,257 | 64.2 |
| 11 | 0 | 0 | 0 | 0 | 0 | 0 | 193 | 10.7 | 1,231 | 68.5 | 1,847 | 102.7 |
| 12 | 0 | 0 | 0 | 0 | 0 | 0 | 1,540 | 70.2 | 1,553 | 70.8 | 1,259 | 57.4 |

| Month | 1967 | | 1968 | | 1969 | | 1970 | | 1971 | |
|-------|-------|-------|-------|-------|-------|-------|--------|-------|--------|--------|
| | x | f | x | f | x | f | x | f | x | f |
| Total | 7,007 | 458.3 | 4,651 | 283.0 | 2,949 | 191.8 | 10,117 | 575.6 | 19,500 | 1107.3 |
| 1 | 361 | 22.8 | 368 | 23.2 | 301 | 19.0 | 951 | 60.0 | 2,943 | 185.8 |
| 2 | 994 | 68.9 | 214 | 14.8 | 354 | 24.5 | 442 | 30.6 | 1,789 | 123.9 |
| 3 | 842 | 86.0 | 339 | 34.6 | 267 | 27.3 | 350 | 35.7 | 1,690 | 172.4 |
| 4 | 1,341 | 104.1 | 1,033 | 80.2 | 857 | 66.6 | 1,017 | 79.0 | 633 | 49.1 |
| 5 | 1,129 | 58.3 | 513 | 26.5 | 42 | 2.2 | 767 | 39.6 | 277 | 14.3 |
| 6 | 170 | 6.9 | 172 | 7.0 | 0 | 0 | 106 | 4.3 | 1,201 | 49.0 |
| 7 | 0 | 0 | 416 | 16.6 | 241 | 9.6 | 275 | 11.0 | 3,906 | 155.9 |
| 8 | 72 | 3.3 | 437 | 20.0 | 184 | 8.4 | 221 | 10.1 | 1,069 | 48.8 |
| 9 | 365 | 18.2 | 111 | 5.5 | 323 | 16.1 | 392 | 19.5 | 569 | 28.4 |
| 10 | 592 | 30.2 | 556 | 28.4 | 160 | 8.2 | 1,651 | 84.3 | 1,645 | 84.0 |
| 11 | 755 | 42.0 | 375 | 20.8 | 0 | 0 | 2,147 | 119.4 | 2,324 | 129.3 |
| 12 | 385 | 17.5 | 119 | 5.4 | 220 | 10.0 | 1,798 | 82.0 | 1,454 | 66.3 |

Appendix table 2. Extent of distribution range of the South population of albacore in 5-degree square in the average years, and amount of effective effort in thousand hooks and overall fishing intensity in thousand hooks per 5-degree square of Japanese longline fishery, 1956-1971.

A. S-1 subarea for adult stock.

| Month | Area | 1956 | | 1957 | | 1958 | | 1959 | | 1960 | |
|-------|--------|------|-----|------|------|-------|------|-------|------|-------|-------|
| | | x | f | x | f | x | f | x | f | x | f |
| Total | 638.89 | 71 | 1.5 | 570 | 10.9 | 1,055 | 19.8 | 4,902 | 82.2 | 7,580 | 124.8 |
| 1 | 61.48 | 0 | 0 | 0 | 0 | 66 | 1.1 | 448 | 7.3 | 961 | 15.6 |
| 2 | 59.55 | 0 | 0 | 6 | 0.1 | 241 | 4.0 | 458 | 7.7 | 414 | 6.9 |
| 3 | 47.52 | 0 | 0 | 3 | 0.1 | 78 | 1.7 | 122 | 2.6 | 98 | 2.1 |
| 4 | 46.21 | 0 | 0 | 13 | 0.3 | 129 | 2.8 | 125 | 2.7 | 170 | 3.7 |
| 5 | 41.41 | 0 | 0 | 61 | 1.5 | 34 | 0.8 | 177 | 4.3 | 141 | 3.4 |
| 6 | 45.10 | 3 | 0.1 | 32 | 0.7 | 189 | 4.2 | 75 | 1.7 | 80 | 1.8 |
| 7 | 41.67 | 33 | 0.8 | 59 | 1.4 | 6 | 0.1 | 17 | 0.4 | 59 | 1.4 |
| 8 | 45.74 | 13 | 0.3 | 56 | 1.2 | 29 | 0.6 | 0 | 0 | 11 | 0.2 |
| 9 | 57.21 | 6 | 0.1 | 166 | 2.9 | 30 | 0.5 | 24 | 0.4 | 52 | 0.9 |
| 10 | 66.19 | 6 | 0.1 | 34 | 0.5 | 113 | 1.7 | 300 | 4.5 | 436 | 6.6 |
| 11 | 65.95 | 1 | 0.0 | 47 | 0.7 | 35 | 0.5 | 974 | 14.8 | 2,017 | 30.6 |
| 12 | 60.86 | 8 | 0.1 | 93 | 1.5 | 104 | 1.7 | 2,181 | 35.8 | 3,142 | 51.6 |

| Month | 1961 | | 1962 | | 1963 | | 1964 | | 1965 | | 1966 | |
|-------|-------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|
| | x | f | x | f | x | f | x | f | x | f | x | f |
| Total | 9,587 | 171.7 | 27,060 | 448.3 | 16,990 | 288.6 | 37,083 | 615.9 | 26,271 | 469.8 | 19,686 | 334.0 |
| 1 | 1,374 | 22.4 | 5,533 | 90.0 | 8,045 | 130.9 | 7,016 | 114.1 | 5,741 | 93.4 | 7,915 | 128.7 |
| 2 | 695 | 11.7 | 1,763 | 29.6 | 2,169 | 36.4 | 3,112 | 52.3 | 2,411 | 40.5 | 3,248 | 54.5 |
| 3 | 201 | 4.2 | 304 | 6.4 | 582 | 12.2 | 665 | 14.0 | 666 | 14.0 | 273 | 5.8 |
| 4 | 541 | 11.7 | 676 | 14.6 | 1,333 | 28.9 | 929 | 20.1 | 850 | 18.4 | 234 | 5.1 |
| 5 | 386 | 9.3 | 163 | 3.9 | 104 | 2.5 | 122 | 3.0 | 97 | 2.3 | 37 | 0.9 |
| 6 | 652 | 14.5 | 160 | 3.6 | 1 | 0.0 | 192 | 4.2 | 316 | 7.0 | 8 | 0.2 |
| 7 | 589 | 14.1 | 150 | 3.6 | 47 | 1.1 | 502 | 12.0 | 1,039 | 24.9 | 202 | 4.8 |
| 8 | 220 | 4.8 | 751 | 16.4 | 272 | 6.0 | 1,153 | 25.2 | 4,526 | 98.9 | 1,553 | 34.0 |
| 9 | 58 | 1.0 | 467 | 8.2 | 336 | 5.9 | 3,337 | 58.3 | 2,409 | 42.1 | 1,021 | 17.8 |
| 10 | 409 | 6.2 | 995 | 15.0 | 577 | 8.7 | 6,177 | 93.3 | 2,616 | 39.5 | 646 | 9.8 |
| 11 | 1,141 | 17.3 | 5,921 | 89.8 | 1,459 | 22.1 | 6,864 | 104.1 | 2,650 | 40.2 | 1,857 | 28.2 |
| 12 | 3,322 | 54.6 | 10,175 | 167.2 | 2,065 | 33.9 | 7,015 | 115.3 | 2,951 | 48.5 | 2,692 | 44.2 |

| Month | 1967 | | 1968 | | 1969 | | 1970 | | 1971 | |
|-------|-------|-------|-------|-------|-------|------|-------|------|-------|------|
| | x | f | x | f | x | f | x | f | x | f |
| Total | 8,834 | 150.5 | 9,528 | 169.4 | 3,189 | 55.9 | 3,628 | 62.7 | 1,683 | 32.9 |
| 1 | 2,576 | 41.9 | 1,734 | 28.2 | 654 | 10.6 | 1,777 | 28.9 | 89 | 1.4 |
| 2 | 340 | 5.7 | 483 | 8.1 | 151 | 2.5 | 894 | 15.0 | 76 | 1.3 |
| 3 | 144 | 3.0 | 69 | 1.4 | 145 | 3.1 | 84 | 1.8 | 122 | 2.6 |
| 4 | 132 | 2.9 | 37 | 0.8 | 107 | 2.3 | 54 | 1.2 | 267 | 5.8 |
| 5 | 38 | 0.9 | 23 | 0.6 | 91 | 2.2 | 29 | 0.7 | 193 | 4.7 |
| 6 | 12 | 0.3 | 276 | 6.1 | 120 | 2.7 | 78 | 1.7 | 69 | 1.5 |
| 7 | 1 | 0.0 | 634 | 15.2 | 109 | 2.6 | 74 | 1.8 | 101 | 2.4 |
| 8 | 840 | 18.4 | 1,407 | 30.8 | 191 | 4.2 | 231 | 5.1 | 179 | 3.9 |
| 9 | 1,453 | 25.4 | 1,124 | 19.6 | 122 | 2.1 | 98 | 1.7 | 198 | 3.5 |
| 10 | 905 | 13.7 | 1,305 | 19.7 | 246 | 3.7 | 57 | 0.9 | 285 | 4.3 |
| 11 | 744 | 11.3 | 943 | 14.3 | 564 | 8.5 | 81 | 1.2 | 102 | 1.5 |
| 12 | 1,650 | 27.1 | 1,493 | 24.5 | 688 | 11.3 | 170 | 2.8 | 2 | 0.0 |

Appendix table 2 (Continued).

B. S-2 subarea for immature stock.

| Month | Area | 1956 | | 1957 | | 1958 | | 1959 | | 1960 | |
|-------|--------|------|---|------|---|------|---|------|---|------|---|
| | | x | f | x | f | x | f | x | f | x | f |
| Total | 375.62 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 31.82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 31.31 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 22.70 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 30.40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 29.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 34.23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 30.26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 33.19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 30.13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 30.83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 36.56 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 34.47 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Month | 1961 | | 1962 | | 1963 | | 1964 | | 1965 | | 1966 | |
|-------|------|-----|-------|------|-------|------|-------|-------|--------|-------|--------|--------|
| | x | f | x | f | x | f | x | f | x | f | x | f |
| Total | 202 | 5.8 | 2,162 | 64.4 | 1,651 | 52.7 | 5,256 | 168.3 | 22,620 | 713.9 | 35,477 | 1135.6 |
| 1 | 0 | 0 | 7 | 0.2 | 27 | 0.8 | 0 | 0 | 89 | 2.8 | 187 | 5.9 |
| 2 | 0 | 0 | 0 | 0 | 4 | 0.1 | 0 | 0 | 73 | 2.3 | 325 | 10.4 |
| 3 | 0 | 0 | 0 | 0 | 1 | 0.0 | 35 | 1.5 | 208 | 9.2 | 896 | 39.5 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 498 | 16.4 | 4,862 | 159.9 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,556 | 86.0 | 8,049 | 270.8 |
| 6 | 12 | 0.4 | 0 | 0 | 0 | 0 | 129 | 3.8 | 5,543 | 161.9 | 8,175 | 238.8 |
| 7 | 46 | 1.5 | 76 | 2.5 | 576 | 19.0 | 1,849 | 61.1 | 7,077 | 233.9 | 5,166 | 170.7 |
| 8 | 0 | 0.0 | 8 | 0.2 | 368 | 11.1 | 1,420 | 42.8 | 1,189 | 35.8 | 3,725 | 112.2 |
| 9 | 0 | 0 | 464 | 15.4 | 430 | 14.3 | 1,292 | 42.9 | 1,109 | 36.8 | 1,312 | 43.5 |
| 10 | 1 | 0.0 | 410 | 13.3 | 112 | 3.6 | 330 | 10.7 | 2,312 | 75.0 | 1,298 | 42.1 |
| 11 | 113 | 3.1 | 1,177 | 32.2 | 132 | 3.6 | 191 | 5.2 | 1,931 | 52.8 | 808 | 22.1 |
| 12 | 30 | 0.9 | 20 | 0.6 | 4 | 0.1 | 9 | 0.3 | 35 | 1.0 | 674 | 19.5 |

| Month | 1967 | | 1968 | | 1969 | | 1970 | | 1971 | |
|-------|-------|-------|--------|-------|-------|-------|--------|-------|--------|-------|
| | x | f | x | f | x | f | x | f | x | f |
| Total | 9,512 | 314.3 | 20,277 | 655.6 | 9,907 | 328.3 | 19,322 | 666.4 | 10,354 | 343.9 |
| 1 | 300 | 9.4 | 72 | 2.3 | 258 | 8.1 | 266 | 8.4 | 147 | 4.6 |
| 2 | 394 | 12.6 | 0 | 0 | 946 | 30.2 | 1,861 | 59.4 | 790 | 25.2 |
| 3 | 1,025 | 45.2 | 663 | 29.2 | 1,191 | 52.5 | 3,919 | 172.6 | 1,019 | 44.9 |
| 4 | 891 | 29.3 | 3,221 | 105.9 | 1,160 | 36.7 | 4,609 | 151.6 | 2,092 | 68.8 |
| 5 | 1,323 | 44.5 | 5,141 | 173.0 | 1,571 | 52.9 | 3,864 | 130.0 | 1,864 | 62.7 |
| 6 | 1,224 | 35.8 | 4,734 | 138.3 | 1,616 | 47.2 | 2,561 | 74.8 | 1,286 | 37.6 |
| 7 | 1,065 | 35.2 | 3,061 | 101.1 | 1,286 | 42.5 | 917 | 30.3 | 1,078 | 35.6 |
| 8 | 845 | 25.4 | 1,365 | 41.1 | 568 | 17.1 | 435 | 13.1 | 658 | 19.8 |
| 9 | 466 | 15.5 | 871 | 28.9 | 303 | 10.0 | 63 | 2.1 | 773 | 25.6 |
| 10 | 1,393 | 45.2 | 807 | 26.2 | 327 | 10.6 | 175 | 5.7 | 160 | 5.2 |
| 11 | 462 | 12.6 | 215 | 5.9 | 315 | 8.6 | 361 | 9.9 | 186 | 5.1 |
| 12 | 124 | 3.6 | 127 | 3.7 | 411 | 11.9 | 290 | 8.4 | 302 | 8.7 |

Appendix table 3. Catch of albacore by length class in Japanese Atlantic longline fishery, 1971. A. N-1 subarea.

| Length class | Jan.-Mar. | Apr.-June | July-Sep. | Oct.-Dec. | Total |
|--------------|-----------|-----------|-----------|-----------|---------|
| 48-49 | 47 | 92 | 52 | 13 | 204 |
| 61-62 | 47 | 92 | 52 | 13 | 204 |
| 64-65 | 47 | 92 | 52 | 13 | 204 |
| 65-66 | 94 | 184 | 104 | 27 | 409 |
| 66-67 | 141 | 276 | 156 | 40 | 613 |
| 67-68 | 187 | 368 | 208 | 54 | 817 |
| 68-69 | 187 | 368 | 208 | 54 | 817 |
| 70-71 | 234 | 460 | 260 | 67 | 1,021 |
| 71-72 | 281 | 552 | 311 | 81 | 1,225 |
| 72-73 | 94 | 184 | 104 | 27 | 409 |
| 73-74 | 328 | 644 | 363 | 94 | 1,429 |
| 74-75 | 94 | 184 | 104 | 27 | 409 |
| 75-76 | 328 | 1,644 | 863 | 194 | 1,429 |
| 76-77 | 609 | 1,197 | 675 | 175 | 2,656 |
| 77-78 | 422 | 829 | 467 | 121 | 1,839 |
| 78-79 | 1,080 | 2,123 | 1,197 | 311 | 4,711 |
| 79-80 | 1,033 | 2,031 | 1,145 | 298 | 4,507 |
| 80-81 | 986 | 1,939 | 1,093 | 284 | 4,302 |
| 81-82 | 468 | 921 | 519 | 135 | 2,043 |
| 82-83 | 562 | 1,105 | 623 | 162 | 2,452 |
| 83-84 | 705 | 1,386 | 782 | 203 | 3,076 |
| 84-85 | 422 | 829 | 467 | 121 | 1,839 |
| 85-86 | 986 | 1,939 | 1,093 | 284 | 4,302 |
| 86-87 | 609 | 1,197 | 675 | 175 | 2,656 |
| 87-88 | 562 | 1,105 | 623 | 162 | 2,452 |
| 88-89 | 659 | 1,294 | 730 | 190 | 2,873 |
| 89-90 | 1,267 | 2,491 | 1,405 | 365 | 5,528 |
| 90-91 | 846 | 1,663 | 937 | 244 | 3,690 |
| 91-92 | 1,408 | 2,767 | 1,560 | 406 | 6,141 |
| 92-93 | 846 | 1,663 | 937 | 244 | 3,690 |
| 93-94 | 1,408 | 2,767 | 1,560 | 406 | 6,141 |
| 94-95 | 705 | 1,386 | 782 | 203 | 3,076 |
| 95-96 | 940 | 1,847 | 1,041 | 271 | 4,099 |
| 96-97 | 799 | 1,571 | 886 | 230 | 3,486 |
| 97-98 | 705 | 1,386 | 782 | 203 | 3,076 |
| 98-99 | 1,314 | 2,583 | 1,457 | 379 | 5,733 |
| 99-100 | 846 | 1,663 | 937 | 244 | 3,690 |
| 100-101 | 1,033 | 2,031 | 1,145 | 298 | 4,507 |
| 101-102 | 846 | 1,663 | 937 | 244 | 3,690 |
| 102-103 | 659 | 1,294 | 730 | 190 | 2,873 |
| 103-104 | 562 | 1,105 | 623 | 162 | 2,452 |
| 104-105 | 422 | 829 | 467 | 121 | 1,839 |
| 105-106 | 375 | 737 | 415 | 108 | 1,635 |
| 106-107 | 609 | 1,197 | 675 | 175 | 2,656 |
| 107-108 | 141 | 276 | 156 | 40 | 613 |
| 108-109 | 281 | 552 | 311 | 81 | 1,225 |
| 109-110 | 47 | 92 | 52 | 13 | 204 |
| 110-111 | 94 | 184 | 104 | 27 | 409 |
| 111-112 | 47 | 92 | 52 | 13 | 204 |
| 112-113 | 47 | 92 | 52 | 13 | 204 |
| 114-115 | 47 | 92 | 52 | 13 | 204 |
| 115-116 | 47 | 92 | 52 | 13 | 204 |
| Total | 27,554 | 54,156 | 30,535 | 7,939 | 120,184 |

Appendix table 3 (Continued). B. N-2 subarea.

| Length class | Jan.-Mar. | Apr.-June | July-Sep. | Oct.-Dec. | Total |
|--------------|-----------|-----------|-----------|-----------|--------|
| 49-50 | 0 | 0 | 0 | 16 | 16 |
| 58-59 | 0 | 0 | 0 | 16 | 16 |
| 59-60 | 159 | 53 | 91 | 0 | 303 |
| 60-61 | 234 | 78 | 134 | 0 | 446 |
| 61-62 | 309 | 103 | 178 | 16 | 606 |
| 62-63 | 159 | 53 | 91 | 54 | 357 |
| 63-64 | 75 | 25 | 43 | 0 | 143 |
| 64-65 | 75 | 25 | 43 | 38 | 181 |
| 65-66 | 0 | 0 | 0 | 16 | 16 |
| 66-67 | 0 | 0 | 0 | 54 | 54 |
| 67-68 | 0 | 0 | 0 | 54 | 54 |
| 68-69 | 75 | 25 | 43 | 129 | 272 |
| 69-70 | 75 | 25 | 43 | 151 | 294 |
| 70-71 | 234 | 78 | 134 | 129 | 575 |
| 71-72 | 551 | 183 | 317 | 221 | 1,272 |
| 72-73 | 860 | 285 | 495 | 372 | 2,012 |
| 73-74 | 1,018 | 338 | 586 | 388 | 2,330 |
| 74-75 | 860 | 285 | 495 | 372 | 2,012 |
| 75-76 | 626 | 208 | 360 | 539 | 1,733 |
| 76-77 | 309 | 103 | 178 | 819 | 1,409 |
| 77-78 | 3234 | 78 | 134 | 1,299 | 1,745 |
| 78-79 | 234 | 78 | 134 | 949 | 1,395 |
| 79-80 | 1,486 | 493 | 855 | 1,353 | 4,187 |
| 80-81 | 785 | 260 | 451 | 1,245 | 2,741 |
| 81-82 | 2,112 | 701 | 1,215 | 1,428 | 5,456 |
| 82-83 | 4,149 | 1,377 | 2,386 | 1,428 | 9,340 |
| 83-84 | 4,458 | 1,479 | 2,564 | 1,245 | 9,746 |
| 84-85 | 9,934 | 3,297 | 5,714 | 2,356 | 21,301 |
| 85-86 | 6,261 | 2,078 | 3,601 | 1,633 | 13,573 |
| 86-87 | 7,196 | 2,388 | 4,139 | 2,598 | 16,321 |
| 87-88 | 5,869 | 1,948 | 3,376 | 1,633 | 12,826 |
| 88-89 | 2,429 | 806 | 1,397 | 1,558 | 6,190 |
| 89-90 | 5,243 | 1,740 | 3,015 | 1,746 | 11,744 |
| 90-91 | 1,486 | 493 | 855 | 1,709 | 4,543 |
| 91-92 | 3,055 | 1,014 | 1,757 | 2,005 | 7,831 |
| 92-93 | 2,504 | 831 | 1,440 | 2,356 | 7,131 |
| 93-94 | 2,112 | 701 | 1,215 | 1,763 | 5,791 |
| 94-95 | 3,289 | 1,092 | 1,892 | 2,506 | 8,779 |
| 95-96 | 1,803 | 598 | 1,037 | 1,930 | 5,368 |
| 96-97 | 1,878 | 623 | 1,080 | 2,151 | 5,732 |
| 97-98 | 2,504 | 831 | 1,440 | 2,005 | 6,780 |
| 98-99 | 1,252 | 416 | 720 | 1,649 | 4,037 |
| 99-100 | 2,112 | 701 | 1,215 | 2,469 | 6,497 |
| 100-101 | 1,803 | 598 | 1,037 | 2,210 | 5,648 |
| 101-102 | 860 | 285 | 495 | 1,542 | 3,182 |
| 102-103 | 701 | 233 | 403 | 1,353 | 2,690 |
| 103-104 | 626 | 208 | 360 | 1,040 | 2,234 |
| 104-105 | 551 | 183 | 317 | 760 | 1,811 |
| 105-106 | 234 | 78 | 134 | 555 | 1,001 |
| 106-107 | 309 | 103 | 178 | 426 | 1,016 |
| 107-108 | 234 | 78 | 134 | 501 | 947 |
| 108-109 | 159 | 53 | 91 | 183 | 486 |
| 109-110 | 0 | 0 | 0 | 259 | 259 |
| 110-111 | 0 | 0 | 0 | 75 | 75 |
| 111-112 | 0 | 0 | 0 | 38 | 38 |

Appendix table 3 (Continued). B. N-2 subarea (Continued).

| Length class | Jan.-Mar. | Apr.-June | July-Sep. | Oct.-Dec. | Total |
|--------------|-----------|-----------|-----------|-----------|---------|
| 112-113 | 0 | 0 | 0 | 113 | 113 |
| 113-114 | 0 | 0 | 0 | 16 | 16 |
| 115-116 | 0 | 0 | 0 | 38 | 38 |
| 116-117 | 0 | 0 | 0 | 16 | 16 |
| Total | 83,482 | 27,704 | 48,016 | 53,902 | 213,104 |

Appendix table 3 (Continued). C. S-1 subarea

| Length class | Jan.-Mar. | Apr.-June | July-Sep. | Oct.-Dec. | Total |
|--------------|-----------|-----------|-----------|-----------|--------|
| 87- 88 | 14 | 32 | 21 | 17 | 84 |
| 89- 90 | 28 | 65 | 42 | 34 | 169 |
| 90- 91 | 41 | 96 | 63 | 51 | 251 |
| 91- 92 | 14 | 32 | 21 | 17 | 84 |
| 92-993 | 111 | 258 | 169 | 137 | 675 |
| 93- 94 | 124 | 290 | 190 | 154 | 758 |
| 94- 95 | 124 | 290 | 190 | 154 | 758 |
| 95- 96 | 124 | 290 | 190 | 154 | 758 |
| 96- 97 | 69 | 161 | 105 | 86 | 421 |
| 97- 98 | 387 | 904 | 591 | 481 | 2,363 |
| 98- 99 | 180 | 419 | 274 | 223 | 1,096 |
| 99-100 | 346 | 807 | 528 | 429 | 2,110 |
| 100-101 | 277 | 656 | 422 | 343 | 1,688 |
| 101-102 | 332 | 775 | 507 | 412 | 2,026 |
| 102-103 | 443 | 1,033 | 676 | 549 | 2,701 |
| 103-104 | 277 | 646 | 422 | 343 | 1,688 |
| 104-105 | 290 | 678 | 443 | 360 | 1,771 |
| 105-106 | 166 | 388 | 253 | 206 | 1,013 |
| 106-107 | 83 | 194 | 127 | 103 | 507 |
| 107-108 | 318 | 742 | 485 | 395 | 1,940 |
| 108-109 | 124 | 290 | 190 | 154 | 758 |
| 109-110 | 263 | 613 | 401 | 326 | 1,603 |
| 110-111 | 111 | 258 | 169 | 137 | 675 |
| 111-112 | 69 | 161 | 105 | 86 | 421 |
| 112-113 | 138 | 323 | 211 | 172 | 844 |
| 113-114 | 28 | 65 | 42 | 34 | 169 |
| 114-115 | 41 | 96 | 63 | 51 | 251 |
| 115-116 | 14 | 32 | 21 | 17 | 84 |
| Total | 4,535 | 10,589 | 6,924 | 5,629 | 27,677 |

Appendix table 3 (Continued). D. S-2 subarea.

| Length class | Jan.-Mar. | Apr.-June | July-Sep. | Oct.-Dec. | Total |
|--------------|-----------|-----------|-----------|-----------|-------|
| 48- 49 | 0 | 0 | 0 | 5 | 5 |
| 50- 51 | 0 | 0 | 0 | 5 | 5 |
| 51- 52 | 0 | 133 | 60 | 5 | 198 |
| 52- 53 | 0 | 256 | 116 | 0 | 372 |
| 53- 54 | 0 | 902 | 408 | 0 | 1,310 |
| 55- 56 | 0 | 256 | 116 | 5 | 377 |
| 56- 57 | 0 | 133 | 60 | 10 | 203 |
| 57- 58 | 177 | 133 | 60 | 0 | 370 |
| 58- 59 | 177 | 256 | 116 | 25 | 574 |

Appendix table 3 (Continued). D. S-2 subarea (Continued).

| Length class | Jan.-Mar. | Apr.-June | July-Sep. | Oct.-Dec. | Total |
|--------------|-----------|-----------|-----------|-----------|---------|
| 60- 61 | 0 | 1,035 | 468 | 20 | 1,523 |
| 61- 62 | 89 | 133 | 60 | 25 | 307 |
| 62- 63 | 89 | 133 | 60 | 15 | 297 |
| 63- 64 | 0 | 256 | 116 | 70 | 442 |
| 64- 65 | 0 | 0 | 0 | 50 | 50 |
| 65- 66 | 89 | 389 | 176 | 121 | 775 |
| 66- 67 | 0 | 779 | 352 | 150 | 1,281 |
| 67- 68 | 357 | 1,681 | 760 | 65 | 2,863 |
| 68- 69 | 446 | 2,593 | 1,173 | 200 | 4,412 |
| 69- 70 | 269 | 3,105 | 1,405 | 101 | 4,880 |
| 70- 71 | 269 | 4,796 | 2,170 | 95 | 7,330 |
| 71- 72 | 177 | 3,884 | 1,757 | 50 | 5,868 |
| 72- 73 | 446 | 2,593 | 1,173 | 85 | 4,297 |
| 73- 74 | 177 | 1,681 | 760 | 196 | 2,814 |
| 74- 75 | 89 | 2,716 | 1,229 | 125 | 4,159 |
| 75- 76 | 534 | 1,681 | 760 | 190 | 3,165 |
| 76- 77 | 269 | 2,459 | 1,113 | 396 | 4,237 |
| 77- 78 | 1,072 | 2,337 | 1,057 | 226 | 4,692 |
| 78- 79 | 1,161 | 2,982 | 1,349 | 607 | 6,099 |
| 79- 80 | 2,679 | 3,372 | 1,525 | 251 | 7,827 |
| 80- 81 | 3,843 | 3,105 | 1,405 | 291 | 8,644 |
| 81- 82 | 3,574 | 3,105 | 1,405 | 196 | 8,280 |
| 82- 83 | 4,377 | 3,761 | 1,702 | 135 | 9,975 |
| 83- 84 | 1,787 | 3,761 | 1,702 | 251 | 7,501 |
| 84- 85 | 1,518 | 2,701 | 1,173 | 176 | 7,722 |
| 85- 86 | 2,056 | 2,337 | 1,057 | 216 | 5,666 |
| 86- 87 | 1,072 | 2,982 | 1,349 | 241 | 5,644 |
| 87- 88 | 1,249 | 2,337 | 1,057 | 190 | 4,833 |
| 88- 89 | 446 | 1,424 | 644 | 301 | 2,815 |
| 89- 90 | 715 | 1,681 | 760 | 190 | 3,346 |
| 90- 91 | 534 | 1,681 | 760 | 265 | 3,240 |
| 91- 92 | 177 | 1,947 | 881 | 346 | 3,351 |
| 92- 93 | 357 | 3,238 | 1,465 | 265 | 5,325 |
| 93- 94 | 446 | 3,105 | 1,405 | 381 | 5,337 |
| 94- 95 | 357 | 2,459 | 1,113 | 371 | 4,300 |
| 95- 96 | 446 | 3,105 | 1,405 | 291 | 5,247 |
| 96- 97 | 0 | 2,982 | 1,349 | 326 | 4,657 |
| 97- 98 | 534 | 2,982 | 1,349 | 236 | 5,101 |
| 98- 99 | 89 | 2,070 | 937 | 391 | 3,487 |
| 99-100 | 0 | 2,716 | 1,229 | 206 | 4,151 |
| 100-101 | 269 | 1,947 | 881 | 85 | 3,182 |
| 101-102 | 177 | 1,291 | 584 | 160 | 2,212 |
| 102-103 | 89 | 902 | 408 | 115 | 1,514 |
| 103-104 | 0 | 902 | 408 | 145 | 1,455 |
| 104-105 | 0 | 646 | 292 | 85 | 1,023 |
| 105-106 | 0 | 256 | 116 | 65 | 437 |
| 106-107 | 0 | 523 | 236 | 50 | 809 |
| 107-108 | 89 | 0 | 0 | 25 | 114 |
| 108-109 | 0 | 256 | 116 | 35 | 407 |
| 109-110 | 0 | 0 | 0 | 20 | 20 |
| 110-111 | 0 | 133 | 60 | 5 | 198 |
| Total | 32,788 | 102,479 | 46,364 | 9,150 | 190,781 |