

TUNA FISHERY STATISTICS OF MADEIRA, 1986-1995

de Gouveia, L.¹, A. Amorim¹

SUMMARY

This document updates the Madeiran tuna statistics for recent years. The total catch composition by main species is presented from 1960 to 1995. The evolution and present composition of the Madeiran baitboat fleet, classified by gross tonnage (GT) is also given. The traditional fishing grounds used by the local fleet are shown. The fishery seasonality is referred to and sea surface temperatures anomalies are given, from 1986 to 1995. Bigeye and skipjack size sampling frequencies are also given for the same period of time.

RÉSUMÉ

Ce document présente une actualisation des dernières statistiques de la pêche de thonidés à Madère. La composition dans la prise totale par espèces principales est indiquée pour la période 1960-1995. L'évolution et la composition actuelle de la flottille de canneurs, en tonnage en jauge brute (TJB), sont également données. Les zones traditionnelles de pêche pratiquées par la flottille locale sont indiquées. La saisonnalité de la pêche est décrite et les anomalies relatives à la température de surface de l'eau sont présentées entre 1986 et 1995. Les fréquences d'échantillonnage du thon obèse et du listao sont également signalées pour la même période.

RESUMEN

En este documento se actualizan las estadísticas de tónidos de Madeira de los últimos años. Se presenta la composición de la captura de las principales especies, de 1960 a 1995. También se da la evolución y actual composición de la flota de barcos de cebo de Madeira, clasificadas por toneladas de registro bruto (GT). Se muestran los caladeros tradicionales de la flota local. Se habla del carácter estacional de la pesquería y de las anomalías de la temperatura del mar en superficie, de 1986 a 1995. También se dan frecuencias de talla del patudo y el listado obtenidas por muestreo, para el mismo período.

Tuna catch has been an important fishery resource in Madeira for a long time. Local fishing boats use the traditional pole and line gear with live bait to catch tuna around the islands.

In the catches of tuna and tuna-like species, bigeye (*Thunnus obesus*) and skipjack (*Katsuwonus pelamis*) are the most important species (Tab.I; Fig.1), representing more than 90% of the total in the years 1960-1995. Up to 1990, bigeye is the dominant species, being replaced by skipjack in recent years. Low catches have occurred between 1979 - 1987 and this seems to be due to an alteration on the availability of tuna resources in the area, and not to a general decrease in the stock abundance. In recent years, catches sharply increased mainly due to skipjack catches.

Local tuna fleet composition, classified by gross tonnage, is given (Tab.II; Fig.2). In recent years it is observed that larger fishing boats operate in the area, but the amount of small vessels that usually catch tuna remains constant for the last sixteen years.

Fishing grounds are located around the South coast of Madeira, Desertas and Porto Santo islands (Fig.3). However, important fleet displacements occurred towards Selvagens islands (160 nautic miles South) or Seine seamount (135 nautic miles Northeast) in the period 1986-1989.

Catch seasonality is significant all the year round, defining a typical fishing period for each dominant species (Tab. III, Fig. 4). Bigeye landings mainly occur during second and third quarter of the year and the skipjack take place in the last two quarters. The strong inter-annual variability of the catches observed is most likely due to the variation in the local hydrological conditions, as it has been mentioned in ICCAT species reports, for several years.

Sea surface temperature anomalies were calculated for the period 1986-1995, based on a time series of forty five years (1960-1995). Strong variability on SST anomalies are shown in particular years (Fig. 5), but it is not possible to make a link between catch/species and SST seasonal variation in the area itself.

Size sampling frequencies of bigeye and skipjack are given for the period 1986-1995. There is an increase in the average size of bigeye caught in recent years, for a fork length range between 40 to 175 cm (Tab.IVa; Fig. 6a.). Skipjack length usually ranges from 40 to 74 cm long and size composition is highly variable in each year (Tab.IV b; Fig.6 b.).

¹ Direcção de serviços de investigação das pescas. Direcção regional das pescas. 9000 Funchal, Madeira.

| YEAR | BET | SKJ | OTH | TOTAL |
|------|--------|--------|-------|--------|
| 1960 | 1554.0 | 158.0 | 0.0 | 1712.0 |
| 1961 | 1129.0 | 34.0 | 0.0 | 1163.0 |
| 1962 | 2621.0 | 958.0 | 0.0 | 3579.0 |
| 1972 | 1244.0 | 781.0 | 21.0 | 2046.0 |
| 1963 | 2686.0 | 573.0 | 0.0 | 3259.0 |
| 1964 | 2901.0 | 830.0 | 0.0 | 3731.0 |
| 1965 | 2583.0 | 933.0 | 6.0 | 3522.0 |
| 1966 | 3337.0 | 321.0 | 15.0 | 3673.0 |
| 1967 | 2396.0 | 1359.0 | 12.0 | 3767.0 |
| 1968 | 938.0 | 776.0 | 13.0 | 1727.0 |
| 1969 | 2615.0 | 758.0 | 11.0 | 3384.0 |
| 1970 | 2160.0 | 835.0 | 9.0 | 3004.0 |
| 1971 | 1959.0 | 1491.0 | 11.0 | 3461.0 |
| 1973 | 3031.0 | 750.0 | 37.0 | 3818.0 |
| 1974 | 5708.0 | 446.0 | 219.0 | 6373.0 |
| 1975 | 5008.0 | 491.0 | 831.0 | 6330.0 |
| 1976 | 1959.0 | 1240.0 | 622.0 | 3821.0 |
| 1977 | 3582.0 | 255.0 | 86.0 | 3923.0 |
| 1978 | 2791.0 | 129.0 | 137.0 | 3057.0 |
| 1979 | 1014.7 | 38.9 | 83.6 | 1137.2 |
| 1980 | 224.0 | 29.6 | 61.8 | 315.4 |
| 1981 | 439.2 | 76.7 | 17.0 | 532.9 |
| 1982 | 707.5 | 151.7 | 141.8 | 1001.0 |
| 1983 | 740.6 | 21.2 | 77.3 | 839.1 |
| 1984 | 830.6 | 174.3 | 237.6 | 1242.5 |
| 1985 | 1403.2 | 285.2 | 180.0 | 1868.4 |
| 1986 | 1698.5 | 329.3 | 64.2 | 2092.0 |
| 1987 | 593.1 | 78.9 | 87.5 | 759.5 |
| 1988 | 1395.4 | 356.9 | 158.8 | 1911.1 |
| 1989 | 2188.5 | 1751.2 | 53.9 | 3993.6 |
| 1990 | 2455.4 | 1666.3 | 121.2 | 4242.9 |
| 1991 | 2474.7 | 5474.7 | 118.0 | 8067.4 |
| 1992 | 2891.2 | 4862.2 | 514.2 | 8267.7 |
| 1993 | 1199.8 | 3336.1 | 303.1 | 4839.0 |
| 1994 | 881.1 | 4135.7 | 353.5 | 5370.3 |
| 1995 | 4412.1 | 4356.9 | 310.5 | 9079.5 |

Tab. I - Tuna catch by main species (MT), Madeira, 1960-1995.

| Year | (-50)GT | (51-150)GT | (151-)GT | TOTAL |
|------|---------|------------|----------|-------|
| 1979 | 35 | 6 | | 41 |
| 1980 | 13 | 4 | | 17 |
| 1981 | 18 | 5 | | 23 |
| 1982 | 18 | 3 | | 21 |
| 1983 | 14 | 5 | | 19 |
| 1984 | 16 | 6 | 1 | 23 |
| 1985 | 21 | 5 | | 26 |
| 1986 | 26 | 6 | | 32 |
| 1987 | 19 | 7 | | 26 |
| 1988 | 22 | 10 | | 32 |
| 1989 | 20 | 11 | 4 | 35 |
| 1990 | 22 | 13 | 2 | 37 |
| 1991 | 27 | 10 | 3 | 40 |
| 1992 | 20 | 15 | 3 | 38 |
| 1993 | 11 | 14 | 7 | 32 |
| 1994 | 18 | 14 | 8 | 40 |
| 1995 | 18 | 18 | 9 | 45 |

Tab. II - Fishing tuna fleet composition by Gross Tonnage (GT), Madeira surface fishery, 1979-1995.

| | ALB | BET | SKJ | BFT | YFT | BON | FRI | SWO | BIL | TOTAL |
|--------------|------------------|--------------------|--------------------|-----------------|-----------------|--------------|------------|-----------------|----------------|--------------------|
| JAN | 6,868.0 | 79.1 | 439.0 | 1,294.6 | 0.0 | 24.5 | 0.0 | 4,623.0 | 0.0 | 13,328.2 |
| FEB | 0.0 | 14.7 | 0.0 | 0.0 | 0.0 | 3.5 | 0.0 | 6,189.6 | 0.0 | 6,207.8 |
| MAR | 2,727.0 | 278,934.3 | 0.0 | 0.0 | 0.0 | 33.0 | 0.0 | 5,637.6 | 0.0 | 287,331.9 |
| APR | 51.0 | 1,752,181.1 | 0.0 | 0.0 | 0.0 | 10.0 | 0.0 | 6,709.2 | 0.0 | 1,758,951.3 |
| MAY | 420.0 | 1,037,301.8 | 103,710.0 | 0.0 | 0.0 | 23.0 | 0.0 | 3,243.6 | 316.8 | 1,145,015.2 |
| JUN | 6,380.0 | 346,865.0 | 750,194.0 | 0.0 | 0.0 | 176.0 | 0.0 | 943.8 | 1,164.0 | 1,105,722.8 |
| JUL | 20,699.0 | 555,183.7 | 751,508.0 | 0.0 | 0.0 | 83.0 | 0.0 | 1,029.6 | 1,902.0 | 1,330,405.3 |
| AUG | 0.0 | 58,754.1 | 838,872.0 | 1,120.6 | 31,757.5 | 68.0 | 0.0 | 1,559.4 | 960.0 | 933,091.6 |
| SEP | 7,848.0 | 68,824.3 | 1,014,172.0 | 2,884.9 | 6,019.5 | 70.0 | 9.0 | 937.8 | 921.6 | 1,093,839.2 |
| OCT | 9,625.6 | 57,847.0 | 444,132.6 | 6,512.0 | 7,529.9 | 7.4 | 0.0 | 3,011.8 | 0.0 | 528,666.2 |
| NOV | 13,590.2 | 129,765.7 | 359,971.1 | 109.3 | 3,214.0 | 0.0 | 0.0 | 3,156.7 | 0.0 | 509,806.9 |
| DEC | 134,616.4 | 126,350.7 | 93,958.4 | 0.0 | 202.3 | 3.0 | 0.0 | 4,171.4 | 0.0 | 359,302.2 |
| TOTAL | 202,825.2 | 4,412,101.4 | 4,356,957.1 | 11,921.3 | 48,723.1 | 501.4 | 9.0 | 41,213.5 | 5,264.4 | 9,079,516.5 |

Tab. III - Monthly tuna catch by species (Kg), Madeira, 1995.

| FL (cm) | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------|------------|------------|-------------|-------------|------------|-------------|------------|------------|------------|------------|
| 40 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 1 | 12 | 11 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55 | 4 | 4 | 49 | 43 | 0 | 0 | 0 | 0 | 3 | 0 |
| 60 | 29 | 9 | 66 | 120 | 0 | 1 | 0 | 1 | 7 | 5 |
| 65 | 48 | 34 | 98 | 157 | 6 | 38 | 2 | 0 | 18 | 2 |
| 70 | 105 | 51 | 150 | 253 | 32 | 24 | 8 | 18 | 48 | 6 |
| 75 | 201 | 61 | 193 | 324 | 78 | 93 | 32 | 59 | 98 | 41 |
| 80 | 76 | 40 | 114 | 145 | 37 | 149 | 67 | 65 | 71 | 91 |
| 85 | 32 | 22 | 98 | 75 | 60 | 170 | 67 | 61 | 124 | 89 |
| 90 | 16 | 16 | 132 | 41 | 124 | 196 | 70 | 66 | 127 | 64 |
| 95 | 19 | 27 | 113 | 27 | 136 | 119 | 56 | 63 | 74 | 28 |
| 100 | 10 | 35 | 117 | 18 | 40 | 121 | 41 | 39 | 34 | 56 |
| 105 | 5 | 23 | 66 | 18 | 24 | 66 | 32 | 41 | 15 | 44 |
| 110 | 1 | 32 | 52 | 24 | 38 | 43 | 54 | 22 | 13 | 21 |
| 115 | 3 | 69 | 34 | 58 | 34 | 43 | 49 | 21 | 4 | 12 |
| 120 | 1 | 71 | 27 | 51 | 31 | 54 | 50 | 26 | 4 | 17 |
| 125 | 1 | 66 | 21 | 22 | 38 | 45 | 49 | 16 | 3 | 11 |
| 130 | 2 | 58 | 23 | 15 | 28 | 41 | 33 | 41 | 3 | 13 |
| 135 | 0 | 56 | 20 | 6 | 6 | 18 | 25 | 31 | 7 | 3 |
| 140 | 1 | 46 | 19 | 2 | 9 | 5 | 16 | 14 | 8 | 8 |
| 145 | 0 | 51 | 17 | 0 | 10 | 3 | 14 | 6 | 8 | 2 |
| 150 | 0 | 40 | 16 | 0 | 6 | 0 | 2 | 4 | 12 | 0 |
| 155 | 0 | 31 | 13 | 0 | 3 | 0 | 0 | 1 | 7 | 2 |
| 160 | 0 | 21 | 14 | 0 | 4 | 0 | 0 | 0 | 5 | 0 |
| 165 | 0 | 25 | 10 | 0 | 1 | 0 | 0 | 0 | 5 | 0 |
| 170 | 0 | 9 | 11 | 0 | 2 | 0 | 0 | 0 | 8 | 0 |
| 175 | 0 | 9 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| 180 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 185 | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 190 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 554 | 940 | 1488 | 1410 | 748 | 1229 | 667 | 595 | 709 | 515 |

Tab. IV a - Bigeye length composition/year (5 cm class), Madeira, 1986-1995.

| FL(cm) | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------|-------------|------------|-------------|------------|------------|------------|------------|------------|------------|------------|
| 38 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0 |
| 39 | 8 | 0 | 8 | 2 | 0 | 0 | 0 | 0 | 1 | 0 |
| 40 | 17 | 0 | 31 | 7 | 0 | 0 | 4 | 0 | 0 | 0 |
| 41 | 16 | 4 | 94 | 7 | 2 | 0 | 4 | 0 | 2 | 2 |
| 42 | 12 | 9 | 115 | 21 | 1 | 0 | 4 | 0 | 10 | 7 |
| 43 | 13 | 23 | 126 | 9 | 4 | 0 | 20 | 0 | 10 | 14 |
| 44 | 15 | 36 | 106 | 31 | 13 | 4 | 10 | 0 | 19 | 23 |
| 45 | 47 | 50 | 136 | 36 | 16 | 5 | 4 | 0 | 23 | 24 |
| 46 | 62 | 48 | 122 | 39 | 21 | 6 | 13 | 3 | 26 | 24 |
| 47 | 57 | 42 | 114 | 37 | 27 | 14 | 20 | 6 | 30 | 19 |
| 48 | 73 | 48 | 86 | 28 | 34 | 29 | 17 | 7 | 67 | 18 |
| 49 | 121 | 35 | 60 | 35 | 22 | 24 | 15 | 15 | 116 | 10 |
| 50 | 124 | 31 | 55 | 37 | 34 | 37 | 30 | 16 | 103 | 14 |
| 51 | 144 | 37 | 29 | 37 | 32 | 23 | 25 | 22 | 82 | 13 |
| 52 | 138 | 51 | 16 | 34 | 32 | 20 | 19 | 13 | 53 | 10 |
| 53 | 125 | 26 | 12 | 33 | 33 | 10 | 19 | 18 | 28 | 3 |
| 54 | 78 | 39 | 4 | 24 | 34 | 22 | 14 | 20 | 27 | 3 |
| 55 | 66 | 25 | 8 | 26 | 42 | 25 | 11 | 13 | 16 | 4 |
| 56 | 26 | 30 | 4 | 21 | 21 | 17 | 4 | 14 | 14 | 1 |
| 57 | 28 | 41 | 2 | 7 | 9 | 25 | 2 | 9 | 3 | 0 |
| 58 | 9 | 38 | 1 | 13 | 11 | 22 | 5 | 9 | 4 | 0 |
| 59 | 4 | 19 | 1 | 6 | 7 | 16 | 3 | 6 | 4 | 2 |
| 60 | 1 | 24 | 0 | 4 | 7 | 5 | 8 | 5 | 2 | 0 |
| 61 | 2 | 31 | 0 | 1 | 3 | 5 | 10 | 3 | 4 | 0 |
| 62 | 0 | 35 | 1 | 5 | 1 | 1 | 8 | 1 | 1 | 1 |
| 63 | 0 | 28 | 0 | 1 | 1 | 2 | 12 | 1 | 2 | 0 |
| 64 | 0 | 19 | 0 | 3 | 0 | 0 | 21 | 0 | 1 | 1 |
| 65 | 0 | 17 | 0 | 0 | 0 | 0 | 28 | 0 | 0 | 1 |
| 66 | 0 | 24 | 0 | 1 | 0 | 0 | 22 | 0 | 0 | 3 |
| 67 | 0 | 18 | 0 | 0 | 0 | 0 | 28 | 0 | 0 | 1 |
| 68 | 0 | 9 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 2 |
| 69 | 0 | 11 | 0 | 0 | 0 | 0 | 13 | 0 | 0 | 0 |
| 70 | 0 | 11 | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 0 |
| 71 | 0 | 6 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 |
| 72 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 |
| 73 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 74 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 75 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 76 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 77 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 78 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| TOTAL | 1187 | 867 | 1131 | 507 | 407 | 312 | 442 | 181 | 650 | 200 |

Tab IV b. - Skipjack length composition/year (1 cm class), Madeira, 1986-1995.

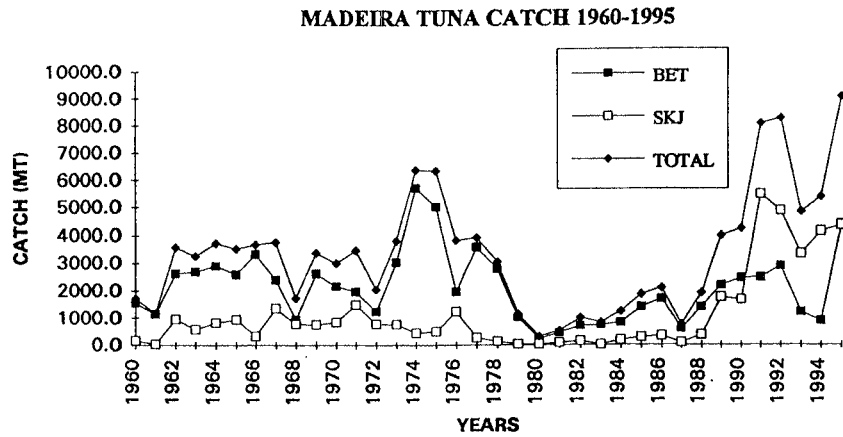


Fig. 1 - Tuna catch by main species (MT), Madeira, 1960 - 1995.

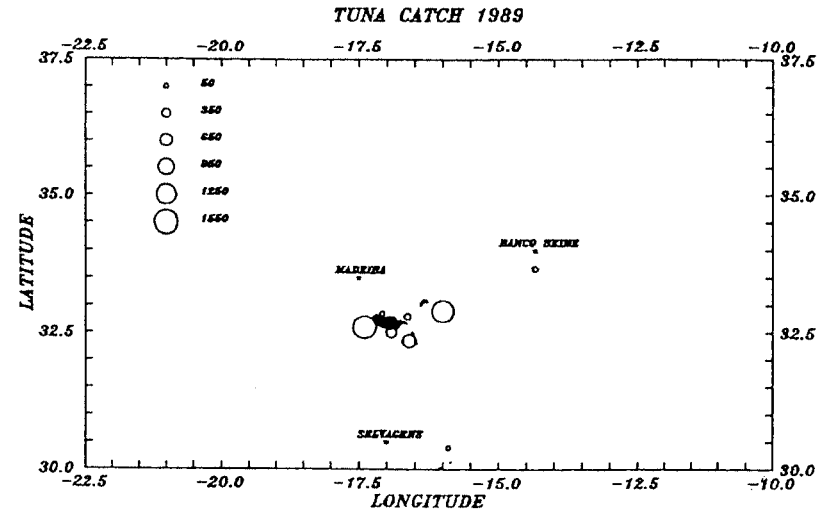


Fig. 3 - Tuna catch by fishing grounds around Madeira, 1989. Tuna catch in recent years show the same fishing ground pattern.

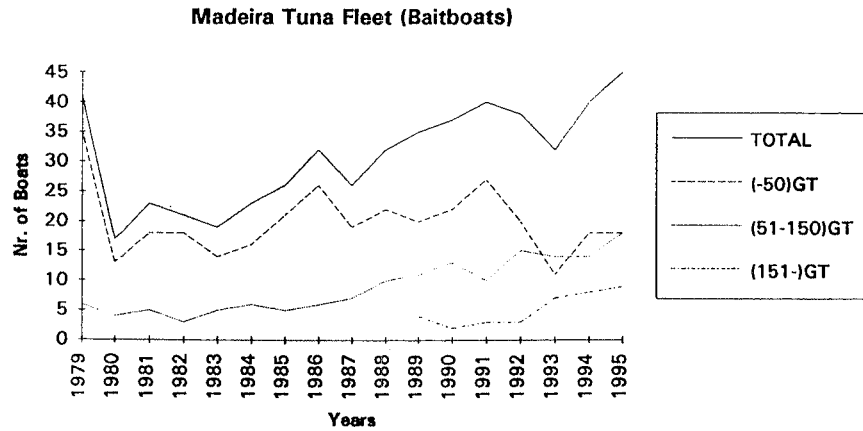
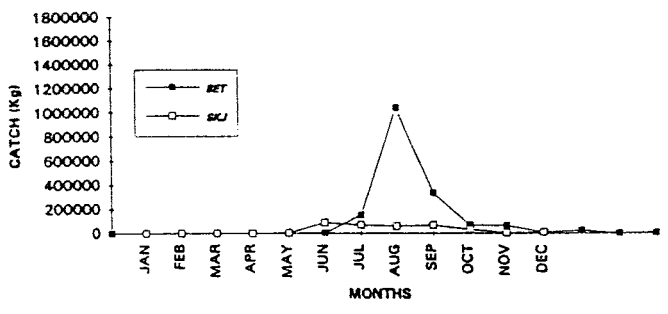
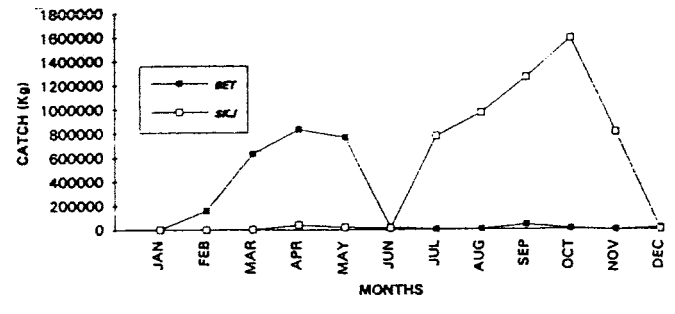


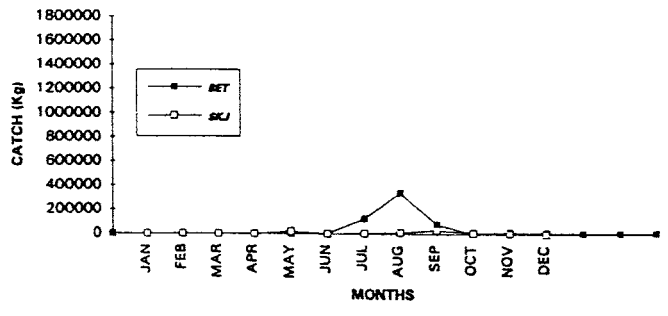
Fig. 2 - Fishing tuna fleet composition by Gross Tonnage (GT), Madeira surface fishery, 1979 -1995.



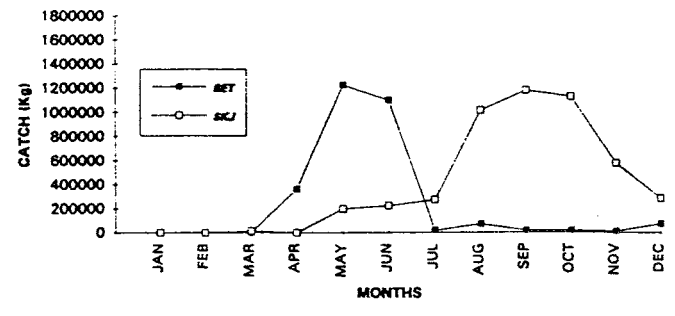
MADEIRA TUNA CATCH 1987



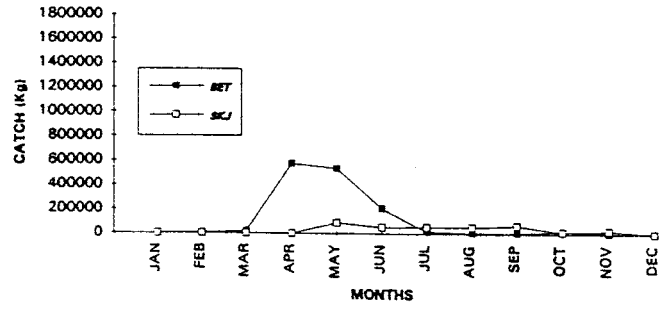
MADEIRA TUNA CATCH 1992



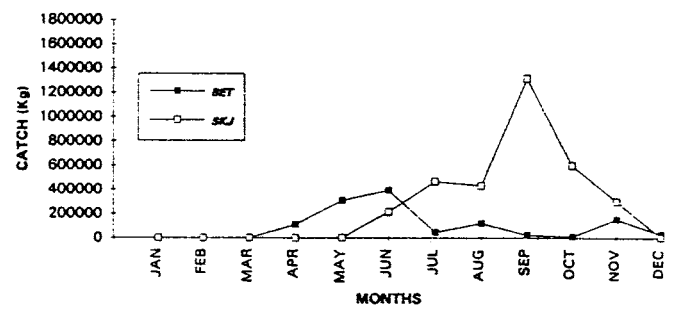
MADEIRA TUNA CATCH 1988



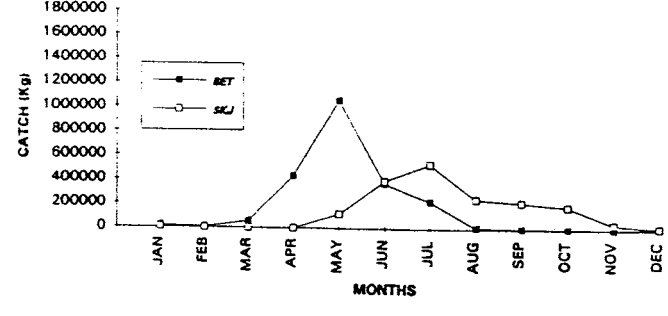
MADEIRA TUNA CATCH 1993



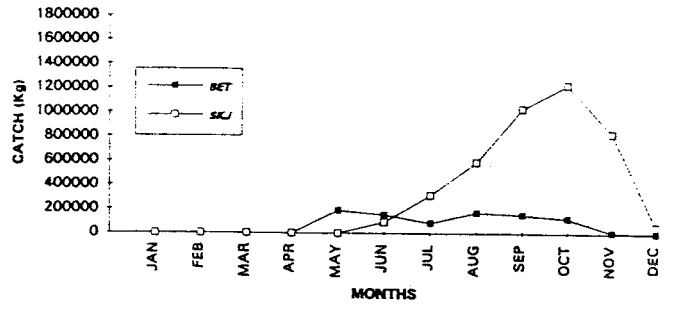
MADEIRA TUNA CATCH 1989



MADEIRA TUNA CATCH 1994



MADEIRA TUNA CATCH 1990



MADEIRA TUNA CATCH 1995

Fig. 4 - Tuna catch seasonality for major species (BET and SKJ) caught in Madeira, 1986 - 1995.

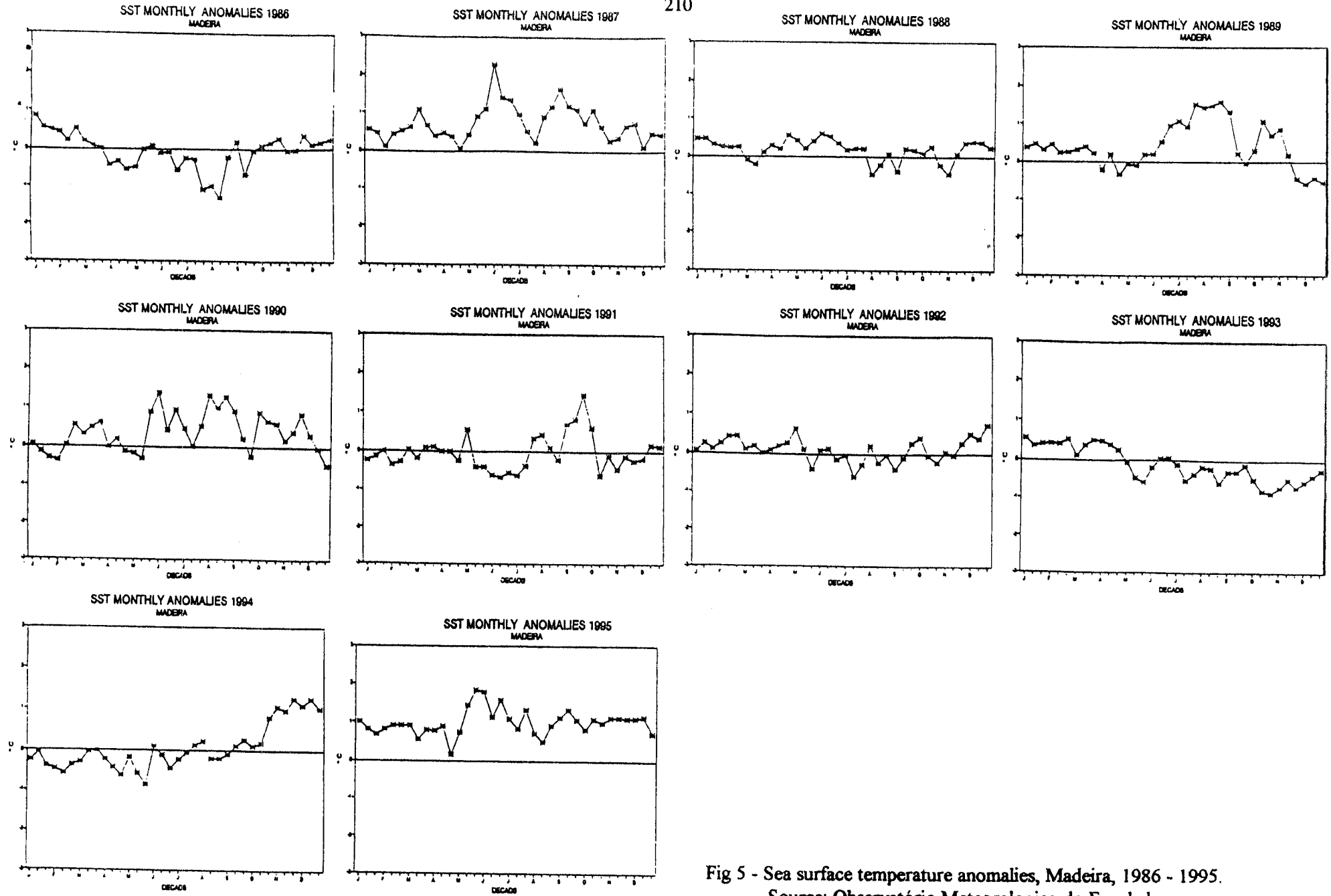


Fig 5 - Sea surface temperature anomalies, Madeira, 1986 - 1995.
 Source: Observatório Meteorológico do Funchal.

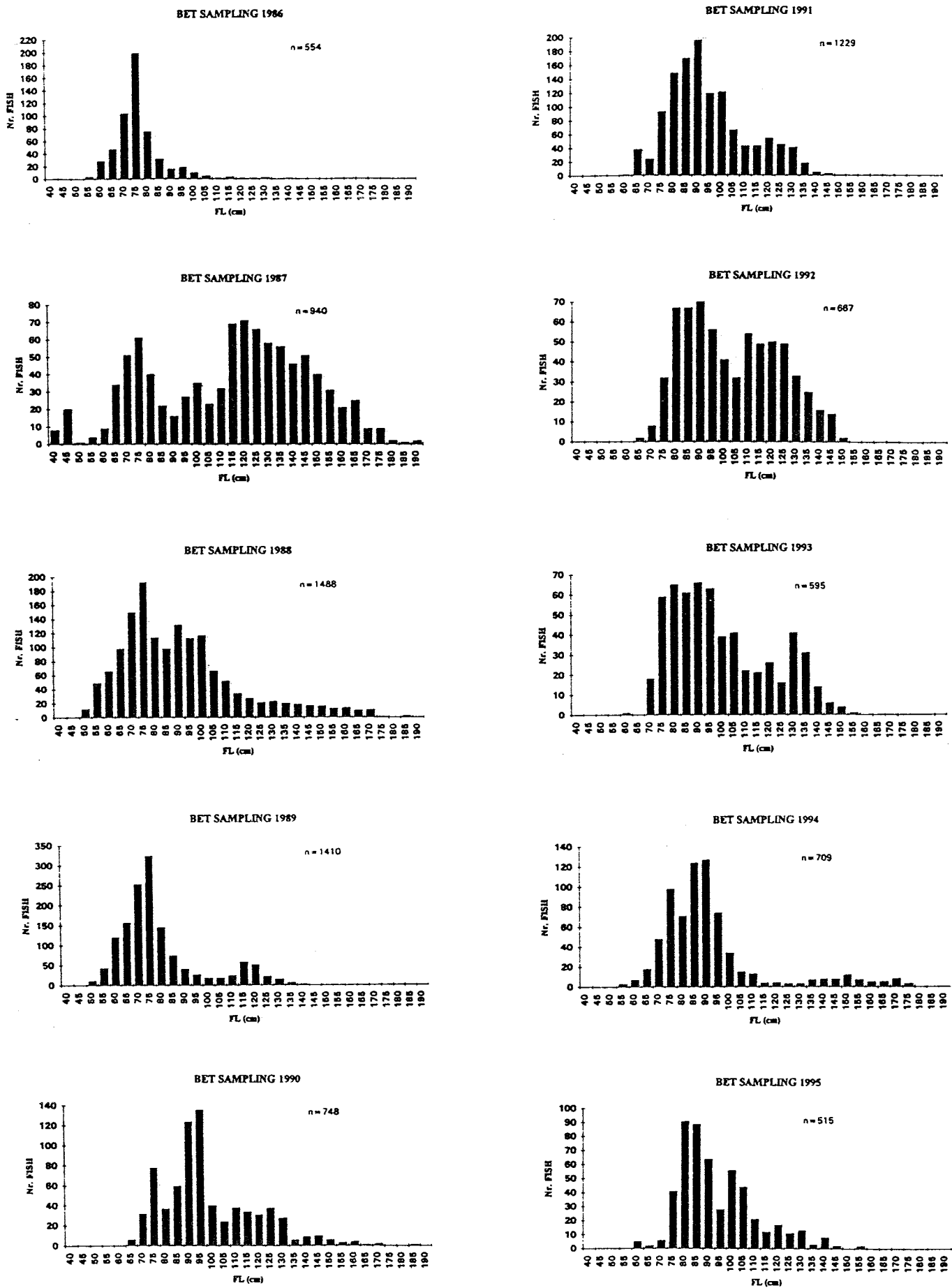


Fig. 6 a. - Bigeye length composition /year (5 cm class.), Madeira, 1986 - 1995.

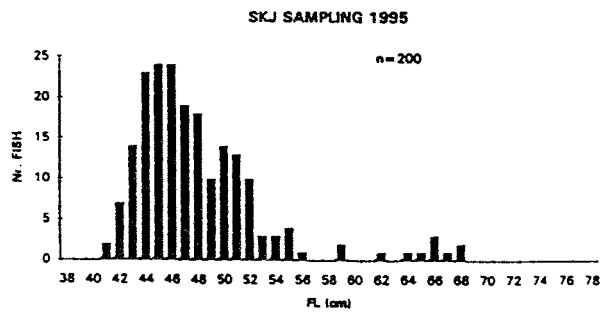
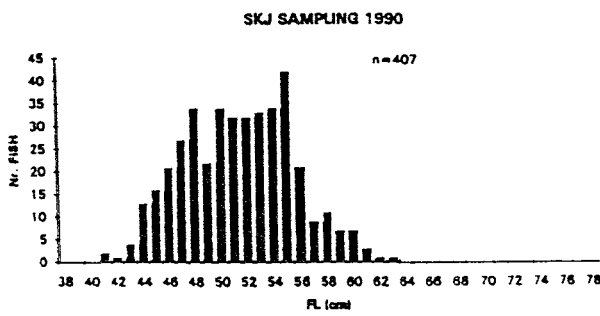
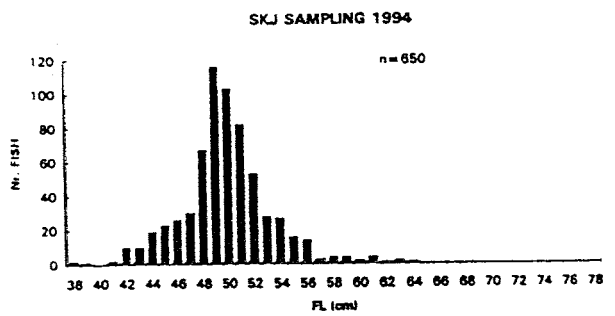
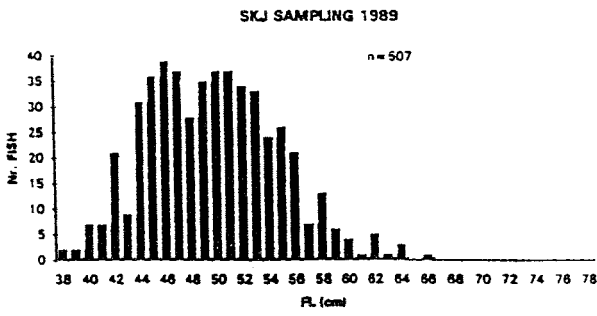
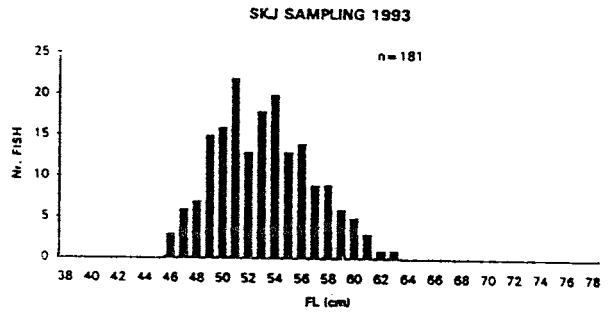
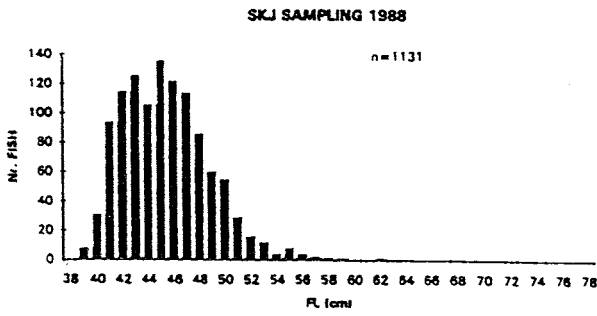
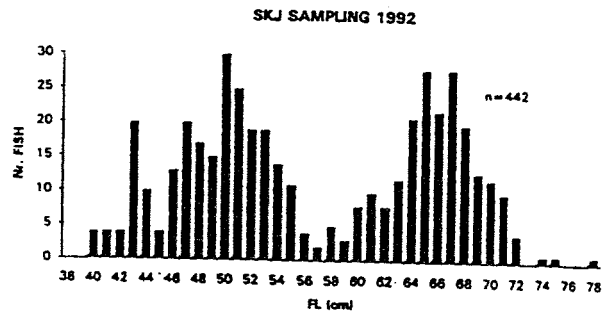
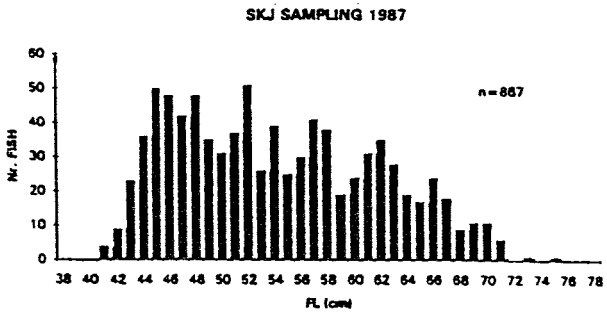
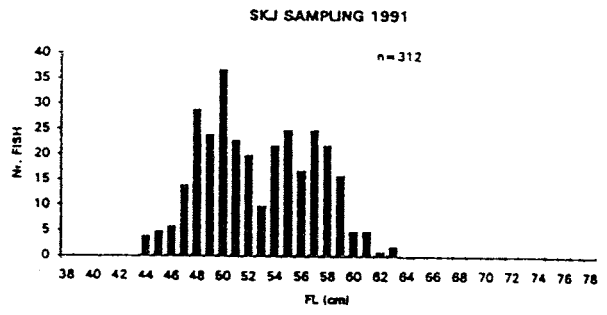
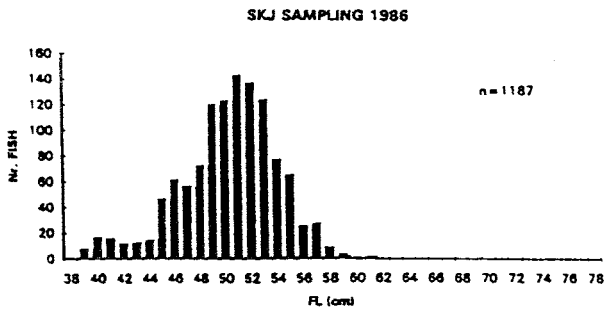


Fig. 6 b. - Skipjack length composition /year (1 cm class), Madeira, 1986 - 1995.