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# THE SWORDFISH (*Xiphias gladius* L. 1758) FISHERY IN THE AZORES, FROM 1987 TO 1993

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**SUMMARY**

The aim of this work is to analyze the swordfish fishery (*Xiphias gladius*) in the Azores over the period 1987-93. This pelagic longline fishery is a very recent one which started in 1987. Before this year, the fishery is considered accidental, with total landings of less than 30 tons in the region.

The longline fleet is divided in four components based on physical characteristics of the fishing vessels and on their fishing regimes. These components are: open-wooden boats, cabined boats from the Azores, cabined boats from the Mainland and "Luso-American" cabined boats.

The fishery takes place mainly between June and December and catch rate analyses were made during this period. For the estimation of total fishing effort, the component of the Azorean cabined boats was used to estimated fishing effort. Catch rates in kg/hook units were good indicators of the swordfish availability to the fishing gear.

During the study period, the total catch (in weight) showed an increasing trend with a minimum in 1989 (107 t) and a maximum in 1991 (498 t). The total fishing effort in standard units showed an increasing trend with a minimum in 1989 (149 thousand hooks) and a maximum in 1993 (2.4 million hooks). The estimates of abundance decreased year after year, from 96 kg/100 hooks in 1987 to 17 kg/100 hooks (the minimum index) in 1993.

**RESUME**

L'objectif de ce travail est d'analyser la pêcherie d'espadon (*Xiphia gladius*) aux Açores entre 1987 et 1993. La pêche à la palangre pélagique est très récente, puisqu'elle n'a commencé qu'en 1987. Avant cette date, la pêche à l'espadon était considérée comme accessoire, avec des débarquements inférieurs à 30 TM dans la région.

La flottille des palangriers est composée de 4 élèments. Cette classification est basée sur les caractéristiques physiques des bateaux de pêche et sur leur régime de pêche. Il s'agit des caractéristiques suivantes : bateaux ouverts, en bois ; bateaux à cabines, des Açores ; bateaux à cabines, de la péninsule ; bateaux à cabines "luso-américains".

La pêche a lieu principalement entre juin et décembre et l'analyse des taux de capture a été réalisée durant cette période. Pour l'estimation de l'effort total de pêche, on a utilisé les données des bateaux à cabines des Açores. Les taux de capture en kg/hameçons ont été de bons indicateurs de la disponibilité de l'espadon à l'engin de pêche.

Au cours de la période étudiée, la prise totale (en poids) montre une tendance à la hausse avec un minimum en 1989 (107 TM) et un maximum en 1991 (498 TM). L'effort de pêche total en unités standard montrait également une tendance à la hausse avec un minimu en 1989 (149.000 hameçons) et un maximum en 1993 (2,4 millions d'hameçons). L'abondance estimée a diminué d'année en année, de 96 kg/100 hameçons en 1987 à 17 kg/100 hameçons (indice minimum) en 1993.

**RESUMEN**

El propósito de este estudio es analizar la pesquería de pez espada (*Xiphias gladius*) en Azores durante el período 1987-93. Esta pesquería de palangre pelágico es muy reciente, iniciándose en 1987. Antes de ese año, la pesquería se consideraba accidental, con desembarques totales de menos de 30 t en la región.

La pesquería de palangre se divide en cuatro componentes basados en características físicas de los barcos pesqueros y en sus regímenes de pesca. Estos componentes son: embarcaciones abiertas, de madera; embarcaciones con cabina, de Azores; embarcaciones con cabina, del continente, y embarcaciones con cabina "luso-americanas".

La pesquería tiene lugar principalmente entre junio y diciembre y se efectuó el análisis de las tasas de captura durante este período. Para la estimación del esfuerzo de pesca total, se utilizó el componente de los barcos con cabina, de Azores, para estimar el esfuerzo de pesca. Las tasas de captura en unidades kg/anzuelos constituyeron buenos indicadores de la disponibilidad del pez espada al arte de pesca.

Durante el período estudiado, la captura total (en peso) muestra una tendencia al aumento con un mínimo en 1989 (107 t) y un máximo en 1991 (498 t). El esfuerzo de pesca total en unidades estándar también mostró una tendencia al aumento con un mínimo en 1989 (149.000 anzuelos) y un máximo en 1993 (2,4 millones de anzuelos). Las estimaciones de la abundancia decrecieron un año tras otro, desde 96 kg/100 anzuelos en 1987 a 17 kg/100 anzuelos (índice mínimo) en 1993.

## I- Introduction

The swordfish (*Xiphias gladius*) fishery in the Azores was first described by PEREIRA (1988) and the present study attempts at improving our knowledge on the subject.

The target fishery in the Azores started in 1987 following the good results of fishing experiments during 1985-86, with the use of surface longline. Before this year, the fishery is considered accidental with landings of less than 30 tons in the Region.

During the period 1987-89, the longline fleet is composed of two components, one named Azores component and other named Continental component (Portugal Continental). The Azores component is composed of smaller fishing vessels with smaller gross tonnage and engines than the Continental component. The azorean fishing vessels target swordfish only over the summer months, and over the winter months, they target the demersal fish community. The fishing vessels of the Continental component (larger fishing vessels with larger gross tonnage and engines), on the contrary, fish for swordfish all over the year.

In 1990, one third component started fishing for swordfish. It is composed by open-wooden boats of small sizes and fish essentially swordfish.

In 1992, one fourth component started fishing swordfish in the Azores with fishing vessels named "luso-american", which are similar to the component from Mainland but with a different fishing regime.

The swordfish is also caught as a by-catch from the demersal fishery, using the bottom longline.

The aim of this work is to analyze the swordfish fishery over the period 1987-93. The base information for this study was achieved from enquiries to the fishermen to know the evolution of fishing gear as well as to define the fishing regimes of each fleet component during the study period. Parallel to these enquiries, a data base was created with swordfish landings and by-catch species, from each fleet component. The information on landings is based on the three most important fishing harbors: Doca (Ponta Delgada) and Rabo de Peixe, in S.Miguel island, and Cais Sta Cruz (Horta), in Faial island. These three harbors represent 85% of swordfish total landings from the Azores.

## II- Fishing gear

Schematically, a longline consists of a mainline with a fixed length to which branch-lines with hooks are attached at fixed distances. The mainline is suspended from the surface by buoys, attached at fixed distances, by float-lines. The longline presents many modifications depending on region, relatively to the type of lines, configuration of the longline, type of hooks, and others.

During 1987-89, the most used longline was one named spanish longline, described by REY & ALOT (1984), with some modifications. However, during this period, some fishing vessels used another longline named U.S. longline. From 1990, the U.S. longline completely replaced the spanish one.

The basic differences between these two types of longlines are:

a) Separation of the three major components of the longline, i.e., mainline, branch-lines with hooks and buoys. In the U.S. type, these three components are separated. The mainline is rolled in a monofilament longline spool, the branch-lines and hooks are disposed in a box, in outlet order and the buoys are attach in a proper place. In the spanish type, the branch-lines with hooks are previously fixed on the mainline, which is done inland, and these two components are placed in a box in outlet order (FERNANDES, 1988);

b) Crew number. In the spanish type, the crew number is 15 men, which 7 men are needed to fish with the U.S. type (FERNANDES, op.cit.);

c) Type of material used in mainline. In the spanish type, the material used in the mainline is twisted polyethylene while in the U.S. type monofilament is used. FERNANDES (op.cit.) refered that monofilament has several advantages. It is heavier than the twisted polyethylene, it has lower visibility and it doesn't releases smells. The weight of spanish longline could be increase by joinning some heavy material like rocks, sinkers and others. The disadvantage of monofilament is that it is less flexible than twisted polyethylene.

d) Type of hook. In the spanish longline, the hooks are straight barbled type 1/0 while in the U.S. longline both type 1/0 and a tuna circled hook, type 17/0 can be used. PEREIRA (op.cit.) refers that the circled hooks are 10 to 15% more efficient than type 1/0 hooks.

## III- Longline fleet components

The target longline fleet was divided in four components, based on the physical characteristics of the fishing vessels and on their fishing regimes. The components are: Open-wooden boats (BA), cabined boats from the Azores (CAZOR), cabined boats from Mainland (CCONT) and the "luso-american" cabined boats (CLA).

In 1993, the longline fleet is characterized by:

### 1) Physical characteristics of the fishing vessels

The Table I shows for each component of the longline fleet, the physical characteristics of the fishing vessels.

The component BA is represented by open-wooden boats with less than 12 meters of overall length, less than 20 GRT and minor 60 HP.

The component CAZOR is represented by cabined boats between 12 to 19 meters of overall length, between 20 to 90 GRT and between 180 to 200 HP.

The component CCONT is represented by cabined boats between 27 to 30 meters of overall length, between 160 to 180 GRT and between 500 to 700 HP.

The component CLA is represented by cabined boats with 26 meters of overall length, with 160 GRT and 600 HP.

### 2) Fishing regimes

The component BA fish swordfish all over the year. The fishing areas are confined to the coast of S. Miguel, around 3 miles offshore, and Rabo de Peixe is their fishing harbor.

The type of hook used is 17/0 and the bait is spanish mackerel (*Scomber japonicus*). The average number of hooks-per-set is 800 and the average number of sets-per-trip is 1.

The longline used by this fleet component is very rudimentary, without some fishing equipments as a monofilament longline spool, hauler and acoustics equipment. The hauling is made by hand, starting in the longline extreme which is attached to the boat. In the other extremity, a float with a light signal may be attached.

Some fishing vessels catch swordfish as a by-catch species from the demersal fishery, using the bottom longline. However, the total landings don't exceed 1 ton.

The component CAZOR fish swordfish all over the year. The fishing areas are confine to the azorean EEZ. However, their are differences in the fishing areas between winter and summer months, probably relating to temperature. In the summer months, the fishing areas are located near the coast of the Central Group of the Archipelago (Faial, Pico, S.Jorge, Graciosa and Terceira Islands) and in the fishing grounds near these islands.

Their fishing harbor is Doca (Ponta Delgada). The type of hook is 17/0 and the bait is Spanish mackerel. The average number of hooks-per-set is 1500 and the average number of sets-per-month-per-boat is 10.

The CAZOR component uses some fishing equipment like the monofilament longline spool, the hauler and the acoustics instrumentations.

Some of these boats catch swordfish as a by-catch species from the demersal fishery, using the bottom longline and the total landing is 7 tons.

The component CCONT fish swordfish all over the year. As CAZOR, the fishing areas in the winter months are different from the summer months. The winter fishing areas are often off the azorean EEZ. The summer fishing areas are similar to the CAZOR.

The fishing harbors are located in Portuguese and/or Spanish mainland depending on market. For fresh market, the fishing harbor is Vigo, Spain and for frozen market, the fishing harbor is Aveiro, Portugal. Sometimes, this component could land in azorean fishing harbors due to bad weather conditions and/or technical problems on fishing vessels.

The type of hook is 17/0 and the bait is spanish mackerel. The average number of hooks-per-set is 2500 and the average number of sets-per-month-per-boat is 20. That component, as the prior, has acoustics onboard, hauler and monofilament longline spool.

Some fishing vessels catch swordfish as a by-catch species from the demersal fishes using the bottom longline with landings of 1 ton.

The component CLA fish all over the year. The fishing areas are similar to the CCONT component. The fishing harbor is Doca (Ponta Delgada). The longline in this component shows some modifications relatively to the others, e.g., type of hook is 9/0, an U.S. type; the bait is squid and the spacement between hooks is 25 to 30 fathoms (1 fathom=1.82 meters), where in the other components the spacement between hooks is 6 to 12 fathoms. Given such large distance between hooks and for the same longline length as CCONT component the number of hooks is less than CCONT. The average number of hooks-per-set is 700 and the average number of sets-per-month-per-boat is 12.

This component shows as fishing equipments the monofilament longline spool, acoustics instruments, hauler and light-sticks, a fishing innovation in this fleet component.

IV- Number of fishing vessels by longline fleet component. Period: 1987-93

Table II shows the number of fishing vessels by each component and total number of fishing vessels during 1987-93.

The component BA starts fishing swordfish in 1990, showing an increase of fishing vessels until 1992 and decreasing in 1993.

The component CAZOR starts fishing in 1987. The number of fishing vessels remains more or less constant until 1992, except for 1989 and decreasing in 1993.

The component CCONT occurs in the swordfish fishery in 1987. The number of fishing vessels showed in Table II don't coincide to the effective number of fishing vessels that operate in the azorean EEZ. Estimates from 1993 give 20 fishing vessels in the Region through only 4 landing in azorean harbors.

The component CLA started fishing in 1992 as a result of fishing agreements showing 2 fishing vessels in 1993.

The total number of fishing vessels which participated in the swordfish target fishery showed an increasing trend, with a maximum of 36 fishing vessels in 1991. Component BA was largely responsible for this peak.

V- Annual landings of swordfish due to the target fishery and accidental fishery

Table III shows the annual landings by fleet component of the target and others fisheries during 1987-93. This data relates to the three most important fishing harbors in the Azores.

The total landings show an increasing trend during the period of this study, reaching a maximum in 1991, due to components BA and CCONT.

VI- By-catch species

The by-catch species from the swordfish fishery are mainly sharks, especially the blue shark (*Prionace glauca*) (Table IV) and the shortfin mako (*Isurus oxyrinchus*) (Table V).

Table VI shows other by-catch species. These species are:

- Others sharks as the porbeagle (*Lamna nasus*), tresher shark (*Alopias vulpinus*), bigeye tresher (*Alopias superciliosus*), smooth hammerhead (*Sphyrna zygaena*), scalloped hammerhead (*Sphyrna lewini*) and tope shark (*Galeorhinus galeus*);
- Tuna species, mainly bigeye (*Thunnus obesus*);
- Billfishes, especially Atlantic blue marlin (*Makaira nigricans*).

Since 1991, the blue shark shows larger landings than the others species. One of the causes for this increase is component BA, which started landing this species. One peculiarity of this component is the landing of all swordfish by-catch species, contrary to other components, where the discards are large. Another cause for the increase of blue shark landings is the appearance of a supply market on shark products (skin, liver, vertebrae and others).

II- Annual fishery analyses by fleet component

The component BA shows an important contribution in 1991, with the entrance of more 16 fishing vessels to the fishery, which resulted in an increase by 100 tons to the landings and a decrease in the catch rates (Kg/hook). After this year, with the decrease in number of fishing vessels the swordfish landings decreased as decreased the catch rates (Figure I).

The component CAZOR shows during the all period a reduction of the catch rates. The swordfish landings increased until 1990, except for 1989, and decreased after, until 1993. The number of fishing vessels increased until 1991, except for 1989, decreasing until 1993 (Figure II).

The reductions in 1989, in fishing vessels and in landings is due to the presence of some tuna boats which have made some fishing experiments with surface longline resulting in landings to the tuna industry. The information about the number of fishing vessels which have made these fishing experiments and the resulting landings is unknown.

The component CCONT shows until 1990 a decrease in landings, fishing vessels and catch rates (in units of t/boat) due to the changing of fishing harbors, as mentioned above. Since 1991, for a more or less constant number of fishing vessels, the landings increased followed by a decrease in the catch rates (Figure III).

The component CLA is very recent in this fishery, starting in 1992. The number of fishing vessels is lower, 2 in 1993. During 1992-93, an increase of one fishing vessel resulted in increased landings as increased the catch rates (Kg/hook) (Figure IV).

VIII- Average monthly landings by each fleet component. Period 1987-93

The aim of these analyses is to define periods of fishing during the year, for each component.

Knowing for each component, that the difference in total landings in the same month is reduced over the seven years of study, the average monthly landings for each component was estimated.

The components BA (Figure V), CAZOR (Figure VI) and CCONT (Figure VII) show the existence of a period of fishing from June to December.

The component CLA (Figure VIII), contrary to the other components, show as well a period of fishing from April to June. It should be pointed out that the peaks of May and September result from just one fishing vessel.

IX- Total fishing effort estimation

After the analysis of the fishery for each component, it was considered that component CAZOR, best describes the swordfish fishery in the Azores.

The components BA, CCONT and CLA were rejected for the following reasons:

Component BA only started fishing in 1990. Another reason is related to the fishing areas, which are confined to S.Miguel island.

Component CCONT shows a fishing operation hardly known. As described above, this component continues fishing in the Azores but the fishing harbors are located in mainland, where it is very difficult to establish the relationship between fishing effort and the resulting landing.

The component CLA is very "young" in the fishery (2 years). Also, it uses a particular fishing strategy, which is different from the other fleet components.

The reasons for choosing component CAZOR, as standard in the estimation of total fishing effort are:

The component CAZOR appears in the fishery at the beginning, warranting a continuity in the fishery. The fishing regime is known over the period of study, which allows the establishment of a relation between fishing effort and landings.

During the year, the existence of a fishing season in the summer months, from June to December is observed. That season could be due to the increase of water temperature, higher than 20°C, which is favorable to the swordfish occurrence (OVCHINNIKOV, 1970 *in* AMORIN, *et al.*, 1979). The average catch rates in the fishing season (June-December), seem to be a good indicator of swordfish availability to the fishing gear, as used in the estimation of total fishing effort.

The estimation of fishing effort in units of component CAZOR, was done using the following equation:

$F = Y / Ucazor$

where, F=Total fishing effort; Y=Total catch (in weight) and U= Catch rates in units of CAZOR component (Table VII).

X- Catch, total fishing effort and cpue

From Table VII and Figure IX, the following is observed:

The total catch decreased until 1989, where a minimum at about 100 tons was observed. After this year, the total catch increased until 1991, showing the maximum at about 500 tons, decreasing after this year.

The total fishing effort increased over the all study period of study, except for 1989, where a minimum at about 400 thousands hooks was observed. The maximum effort occured in 1993, at about 2 million hooks.

The index of abundance decreased year after year, from 96 Kg/100 hooks in 1987 to 17 Kg/100 hooks (the minimum index) in 1993.

The observed decrease in catch per unit of effort (cpue) may be the result of the combination of reduced abundance and/or decreasing mean weight of the catches.

Two periods can be recognized in the swordfish fishery in the Azores. The first one, between 1987-89, is characterized by learning of fishing with surface longline. In this period, it can be seen a change in fishing harbors made by component CCONT, the substitution of the spanish longline type and the development of a swordfish market. It must be pointed out the existence of a seasonal change in the fishery, i.e., in the winter months one part of the fleet fish on demersal fishes with bottom longline and in the summer months they change to swordfish using the surface longline.

The second period, from 1990, is characterized by the entrance of new fleet components, the component BA in 1990 and the component CLA in 1992. Over this period, an increase in the market demand was observed particularly to portuguese mainland and other european countries. Until 1991, it can be seen that some fishing vessels were shifting from bottom longline in the winter months to surface longline in the summer months.

XI- Final considerations

The swordfish fishery in the Azores is a very recent one, showing large changes in market and on the longline fleet. The controlling of these changes, particularly in the first years of fishing, is difficult. In future analyses, it is expected to be able to add some more information with the aim of better analyze the fishery.

In the swordfish fishery different strategies can be observed as fishing areas, types of bait, types of hooks, use of light-sticks, great spacement between hooks and others. Knowing that, it is necessary to improve the data base information used to analyze the swordfish index of abundance. So, it is proposed a study of the effects of fishing area and fishing gear (type of hook, type of bait, spacement between hooks) in the catch rates, with the application of some statistical models.

Knowing that the blue shark is the most important by-catch species in swordfish fishery, a study should be conducted to look at the effect of temperature on swordfish availability as well as the effect of blue shark abundance in a particular area on the catch rates of swordfish. Through such a study one could test the hypothesis that the lower catch rates over the winter months are due to lower temperatures which result in higher catch rates blue shark. These higher catch rates of blue shark might result in lower catch rates of swordfish.

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**Table I:** Physical characteristics of the fishing vessels in each fleet component, in 1993

| Characteristics of the vessels | BA | CAZOR | CCONT | CLA |
|---|---|---|---|---|
| Overall length (meters) | «12 | 12-19 | 27-30 | 26 |
| Gross tonnage (GRT) | «20 | 20-90 | 160-180 | 160 |
| Power of the engine (HP) | «60 | 180-200 | 500-700 | 600 |

**Table II:** Number of fishing vessels in each fleet component and total number of fishing vessels, during 1987-93

| Year | BA | CAZOR | CCONT | CLA | Total |
|---|---|---|---|---|---|
| 1987 | | 7 | 6 | | 13 |
| 1988 | | 7 | 3 | | 10 |
| 1989 | | 3 | 4 | | 7 |
| 1990 | 6 | 7 | 2 | | 15 |
| 1991 | 22 | 9 | 5 | | 36 |
| 1992 | 20 | 8 | 4 | 1 | 33 |
| 1993 | 11 | 4 | 4 | 2 | 21 |

**Table III:** Swordfish landings in each fleet component and swordfish by-catch on others fisheries, during 1987-93, on the three most important fishing ports

| Year | BA (t) | CAZOR (t) | CCONT (t) | CLA (t) | Others fisheries (t) | Total (t) |
|---|---|---|---|---|---|---|
| 1987 | | 117 | 175 | | 8 | 300 |
| 1988 | | 138 | 67 | | 7 | 212 |
| 1989 | | 60 | 30 | | 10 | 101 |
| 1990 | 12 | 174 | 2 | | 10 | 198 |
| 1991 | 137 | 165 | 146 | | 11 | 459 |
| 1992 | 73 | 104 | 44 | 27 | 9 | 258 |
| 1993 | 10 | 116 | 65 | 189 | 8 | 388 |

Note: Numbers were rounded to the nearest unit.

**Table IV:** Blue shark (*Prionace glauca*) by-catch in each fleet component and total landing, during 1987-93, on the three most important fishing ports

| Blue shark (t) | BA | CAZOR | CCONT | CLA | Total |
|---|---|---|---|---|---|
| 1987 | | 11 | | | 11 |
| 1988 | | 0 | 10 | | 10 |
| 1989 | | 1 | | | 1 |
| 1990 | | 0 | | | 0 |
| 1991 | 20 | 1 | 2 | | 23 |
| 1992 | 109 | 31 | 23 | 7 | 170 |
| 1993 | 39 | 15 | 10 | 14 | 79 |

Note: Numbers were rounded to the nearest unit.
Zero catches (0) represent catches lesser than one ton

**Table V:** Shortfin mako (*Isurus oxyrinchus*) by-catch in each fleet compone and total landing, during 1987-93, on the three most important fishing ports

| Shortfin mako (t) | BA | CAZOR | CCONT | CLA | Total |
|---|---|---|---|---|---|
| 1987 | | 8 | 6 | | 14 |
| 1988 | | 5 | 6 | | 11 |
| 1989 | | 4 | 1 | | 5 |
| 1990 | 0 | 3 | 0 | | 4 |
| 1991 | 2 | 4 | 2 | | 9 |
| 1992 | 4 | 4 | 2 | 0 | 10 |
| 1993 | 0 | 0 | 0 | | 0 |

Note: Numbers were rounded to the nearest unit.
Zero catches (0) represent catches lesser than one ton

**Table VI:** Others species by-catch in each fleet component and total landing, during 1987-93, on the three most important fishing ports

| Others species (t) | BA | CAZOR | CCONT | CLA | Total |
|---|---|---|---|---|---|
| 1987 | | 0 | 1 | | 2 |
| 1988 | | 1 | | | 1 |
| 1989 | | 1 | 0 | | 1 |
| 1990 | 0 | 2 | 0 | | 2 |
| 1991 | 1 | 1 | 1 | | 3 |
| 1992 | 1 | 0 | 0 | | 2 |
| 1993 | | 0 | 1 | | 1 |

Note: Numbers were rounded to the nearest unit.
Zero catches (0) represent catches lesser than one ton

**Table VII:** Estimation of total fishing effort (in units of component CAZOR in Azores swordfish fishery

| Years | Total catch in Azores (t) | CPUE (in units of CAZOR) | Total fishing effort (nº of hooks (x 10E3) (in units of CAZOR) |
|---|---|---|---|
| 1987 | 360 | 0.96 | 375 |
| 1988 | 225 | 0.81 | 278 |
| 1989 | 107 | 0.72 | 149 |
| 1990 | 211 | 0.53 | 398 |
| 1991 | 498 | 0.32 | 1556 |
| 1992 | 349 | 0.21 | 1662 |
| 1993 | 404 | 0.17 | 2376 |

Figure I: Annual evolution of landings, (Y), Catch rates, (U) and fishing vessels (V) of component BA

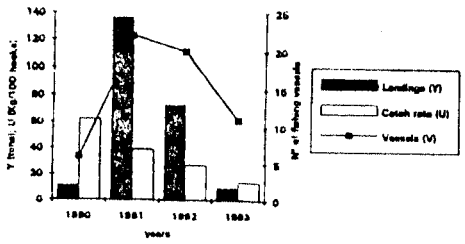


Figure II: Annual evolution of landings, (Y), Catch rates, (U) and fishing vessels (V) of component CAZOR

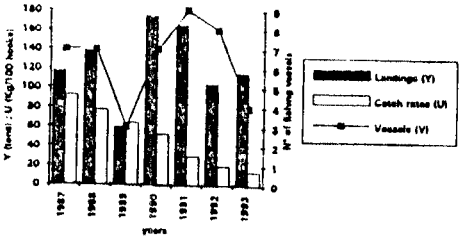


Figure III: Annual evolution of landings, (Y), Catch rates, (U) and fishing vessels (V) of component CCONT

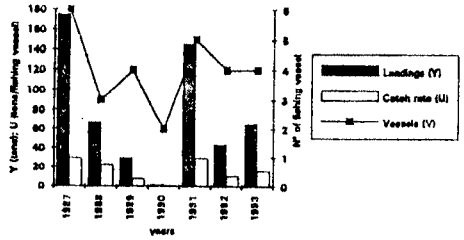


Figure IV: Annual evolution of landings, (Y), Catch rates, (U) and fishing vessels (V) of component CLA

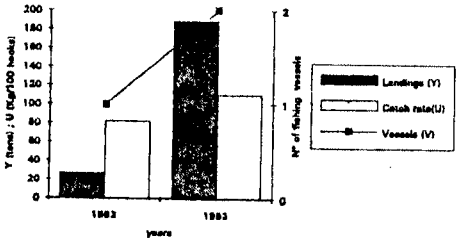


Figure V: Average monthly landings of component BA during 1987-93

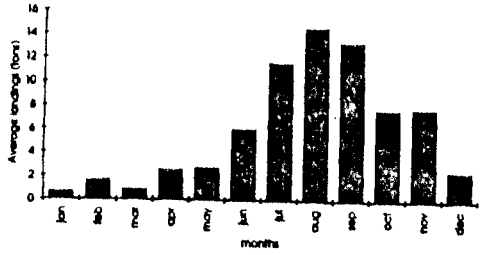


Figure VI: Average monthly landings of component CAZOR during 1987-93

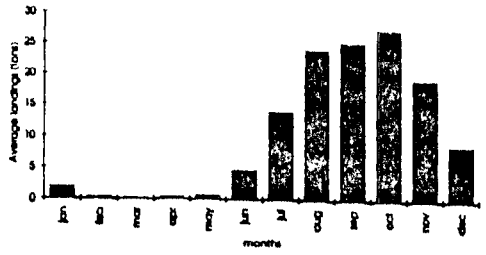


Figure VII: Average monthly landings of component CCONT during 1987-93

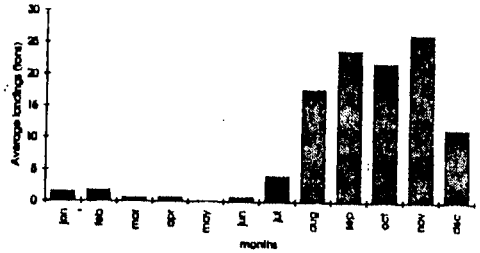


Figure VIII: Average monthly landings of component CLA during 1987-93

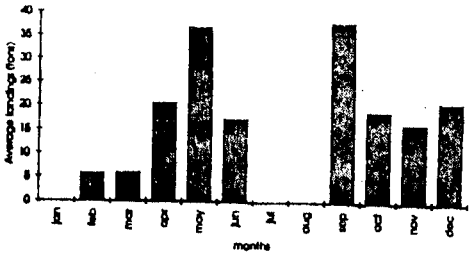


Figura IX: Total Catch (in weight) (A), Total fishing effort in standard units (B) and cpue (C) of swordfish fishery in Azores during 1987-93