

FISHERIES OF THE AZORES (PORTUGAL), 1982-1999

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ABSTRACT

Catch statistics are presented for the Azores Islands (Portugal) by type of fishery. These data were compared with the official ICES statistics (STATLANT) for the years 1982-1999. This represents the time period for which detailed catch statistics have been collected in the Azores. For each fishery, the proportion of under-reported catch is estimated. The fisheries in the Azores are dominated by tuna landings, although several demersal and deep-water species are also targeted. The latter have increased in importance in recent years.

INTRODUCTION

The Azores archipelago (Figure 1) is a group of nine volcanic islands situated on the Mid-Atlantic ridge. The islands and their contiguous shelf (< 500 m depth) have an estimated area of 412 km², which represents only 0.4% of the Azores EEZ of about one million km², while seamounts (< 500 m depth) account for an additional 0.3% (Isidro, 1996). Thus, the shelf is narrow or absent, and fishing grounds are scattered.

Fisheries in the Azores started in the 1600s, long after the colonization of the islands in the early 15th century. Scientific studies in the early 1900s indicated that fish abundances were higher at that time. The present fisheries exploit about 50 species of the 500 fish species composing the ecosystem. The fishery is characterized by small-scale vessels using gillnets, traps and various forms of hook and line. Until 2000, trawlers have never been used around the Azores. Fishing grounds are limited because of topography and technology, and in practice fishing occurs only around islands (about 50 nm) and nearby seamounts (Figure 1).

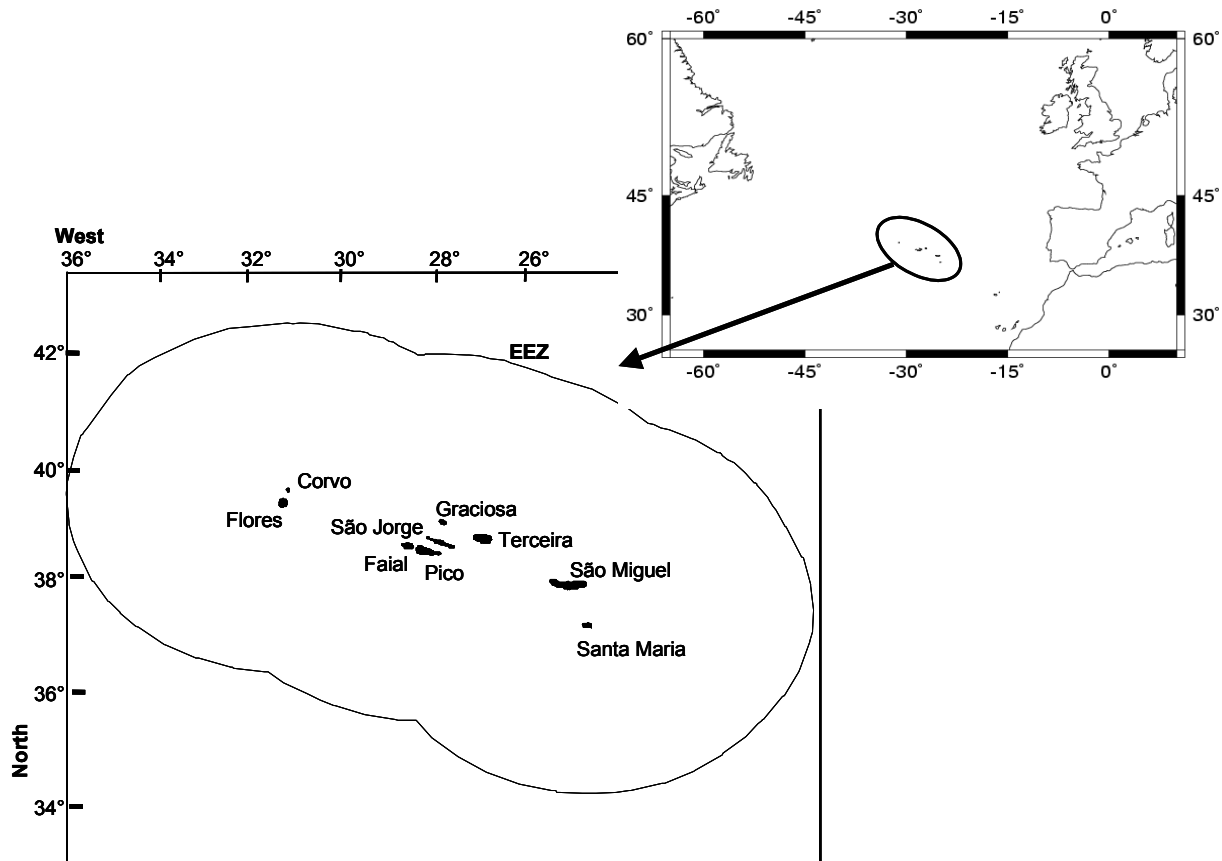


Figure 1. Map of the Azores archipelago and its 200 nm EEZ.

There are about 900 people fishing in the Azores and slightly over 3,000 fishery-related jobs, representing 4.4% of the Azores population of approximately 94,000 (Helder Silva, Megapesca Lda., Portugal, pers. comm.). Ten percent of the jobs are tuna-related while 90% are in the artisanal sector. On average, fishers are active 48% of the year. Tuna are the most important functional group in terms of catch, followed by demersal fish and small pelagic fish (Figure 2).

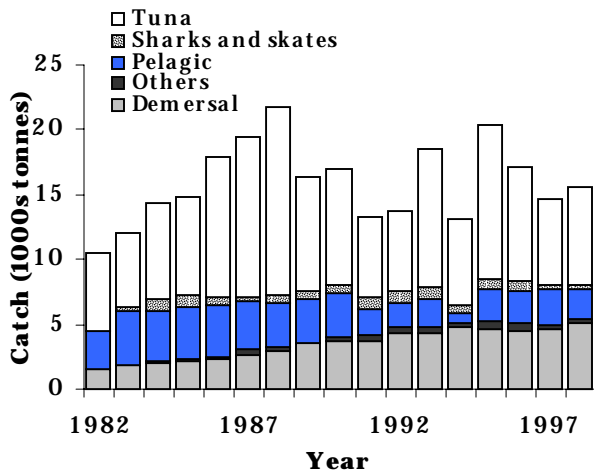


Figure 2. General composition of total catch in the Azores, 1982-1999. The grouping 'others' includes lobster, *Loligo* spp., octopus, seaweeds, swordfish, other benthos and various fishes.

FISHERIES

Tuna

Tuna are seasonally present in the area, migrating and feeding around the islands and seamounts. Adult big-eye tuna (*Thunnus obesus*) is present during April to June. They are caught at an average length of 1 m and 25 kg. Skipjack tuna (*Katsuwonus pelamis*) are caught from June to October at a length of 45 cm (~ 3 kg). Bluefin tuna (*Thunnus thynnus*) is caught in small quantities all year round, while a few yellowfin tunas (*Thunnus albacares*), a more tropical species, are captured in July (Figure 3). The majority of the tuna catch is canned, yielding low value. However, the industry is increasingly targeting the fresh tuna market which yields better prices. Attempts to encourage high-value sashimi grade processing have not yet succeeded (Pereira, 1995; Feio and Dias, 2000).

Tunas are fished with pole-and-line, usually with water spray and live bait. Only 30 Azorean boats fish within the EEZ. Boats are generally 28-32 m long, open-deck, and wooden, although there are a few made of steel or fiberglass. Boat size has

increased through time (Pereira, 1995) and recently seven new boats were built and fishing power increased, all supported by subsidies. It is worth noting that although 20 tuna vessels from Madeira are licensed to fish in the Azores, only four went out in 2000, as catch rates decreased. In fact, the tuna fishery, which traditionally caught over 5,000 tonnes in a good year, has seen its catches fall to less than 3,000 tonnes recently. (Figure 3). Fishing success is influenced by two factors: abundance and variation in migration routes. Depending on the currents, tuna will migrate either through the Archipelago or else at a distance from it, thereby preventing the fishers from reaching them (Rogério Feio, Dept. Oceanography and Fisheries [DOP], University of the Azores, Horta, Azores, pers. comm.).

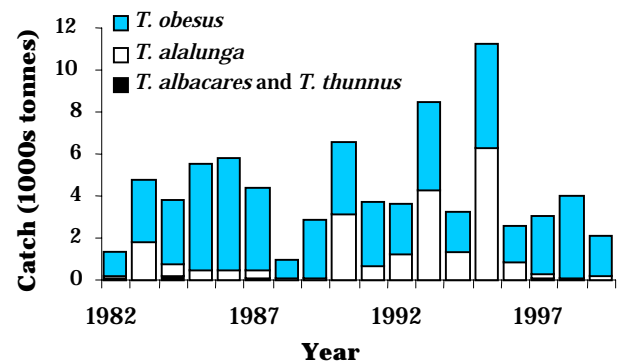


Figure 3. Composition of tuna (top panel) and swordfish catches (bottom panel).

Although bycatch is very low for the tuna fishery, there are some concerns about the demand for bait fishery and cetaceans. To this effect, a collaborative project (POPA) between the industry, the Government of the Azores and the University has been investigating by-catch, using on-board observers covering 50% of the fishing effort (Joao Gil and Rogério Feio, DOP, pers.

comm.). The tuna catch locations were plotted in 40-60 km rings around the islands. The average fishing trip lasted 5 days (range: 1-7 days) and most of the trip was spent looking for shoals. Bottlenose dolphins have the greatest interaction with the tuna fishery by making tuna dive and thus interfering with the fishing activities. However, this only occurred in 5% of the fishing sessions; the data confirmed the official dolphin-safe status of the fishery.

The POPA project also estimated that about 200 tonnes of bait, or 2-3% of the tuna catch in weight, are taken each year for the tuna fishery. The species used are blue jack mackerel (*Trachurus picturatus*, 70%), European pilchard (*Sardina pilchardus*, 10%), chub mackerel (*Scomber japonicus*, 10%), and blackspot seabream (*Pagellus bogaraveo*, 10%). These four species form a very important part of the total catches. Prior to 1991, they accounted for more catch than all other fish species caught in the Azores combined, excluding tuna. Blue jack mackerel of all sizes (10-25 cm) keep well in bait tanks and, together with chub mackerel, are used to catch big-eye tuna. Blackspot seabream of 6-8 cm long and European pilchard are used as bait for skipjack tuna. European pilchard became more abundant in the area in 1999 and thus was used as bait to replace blue jack mackerel (Joao Gil and Rogério Feio, DOP, pers. comm.). However, sardines were taken in larger quantities than blue jack mackerel as they do not keep as well in bait tanks. The bait fish are caught using purse seines, lift nets, or seines, depending on the season and targeted species. The big blackspot seabream and blacktail comber (*Serranus atricauda*) caught in the process (about 30 kg per trip, maximum of 155 trips) were retained for personal consumption.

Swordfish

Swordfish (*Xiphias gladius*) are caught using near-surface longlines and boats divided into three size categories: small open-deck boats, cabin boats and large 30 m vessels (Alexandre Silva, DOP, pers. comm.). The fishery began in the 1980s, and boat size has increased over time. Annual catches of swordfish reached an average of 400 tonnes from 1991 to 1996 and then declined sharply to less than 200 tonnes as a result of problems outside the Azores (Figure 3). In open waters within the EEZ and at its border, several foreign countries (Korea, Spain, Japan) illegally fish large quantities of swordfish. There is also much fishing in adjacent international waters.

The bycatch generated by this fishery is very large. On average, ten large sharks, mainly blue shark (*Prionace glauca*) and shortfin mako (*Isurus oxyrinchus*), are taken for every swordfish hooked. Very large shark specimens were often caught up to ten years ago but have declined since then, perhaps as a consequence of bursts of 'finning' (catching sharks for their fins only) by the Taiwanese in the early and mid-1990s. Billfishes were also taken in fair numbers, but information is rather scarce. Turtles are hooked on swordfish lines, possibly in large numbers. Their chances of survival depend on how deep the line was set, but transmitters placed in the stomachs of 200 turtles suggest a high mortality rate and a possible change in behavior (Helen Martins, DOP, pers. comm.). There appears to be no information about seabird bycatch on the longlines.

Deep water longline

This fishery includes mid-water (200-600 m) and deep-water (600-1200 m) sectors using longlines and individual hand lines. These data are considered poorly represented in the ICES data set. Azorean boats are generally 18 m although a few larger boats were recently added to the fleet. Madeiran boats (25m) come to the area for black scabbard fish (*Aphanopus carbo*), a specialized fishery occurring in waters deeper than 1000 m.

The traditional targets are blackspot seabream, forkbeard (*Phycis phycis*), wreckfish (*Polyprion americanus*), blackbelly rockfish (*Helicolenus d. dactylopterus*), offshore rockfish (*Pontinus kuhlii*), conger eel (*Conger conger*), and the alfonsinos (*Beryx splendens* and *B. decadactylus*). Newer targets include the silver scabbard fish (*Lepidopus caudatus*) and deeper water species (> 1000 m) like the black scabbard fish, greater forkbeard (*Phycis blennoides*) and common mora (*Mora moro*). The fishery generates considerable by-catch. For example, although black scabbard fish have been targeted only since 1997-98, earlier catches of this species were discarded with little reporting. Before 1997, the catches of black scabbard fish were relatively small, because the gear used and the depth range explored were not appropriate for this species. Furthermore, 50% of the blackbelly rockfish caught were discarded due to their size.

Lobster

Locust lobster (*Scyllarus latus*) is caught by traps and hand-picked by divers, both from very small inshore boats. An average of 0.5 tonnes per year is sold at the auction but it is estimated that three

times this amount are landed and sold directly, and are thus not reported. The stock is believed to be depleted, and average size has declined. There is not much information on the other species caught in the Azores: Common spiny lobster (*Palinurus elephas*), toothed rock crab (*Cancer bellianus*), Mediterranean spiny spider crab (*Maja squinado*) and Sally Lightfoot crab (*Grapsus grapsus*).

Squid

Loligo forbesi is the only species of squid caught commercially in the Azores. It is caught with very small boats close to shore, using jigs in daytime at depths of 80-100 m (Porteiro, 1994). The catch is largely unreported, and displays huge inter-annual fluctuations (50 to 450 tonnes, Figure 4).

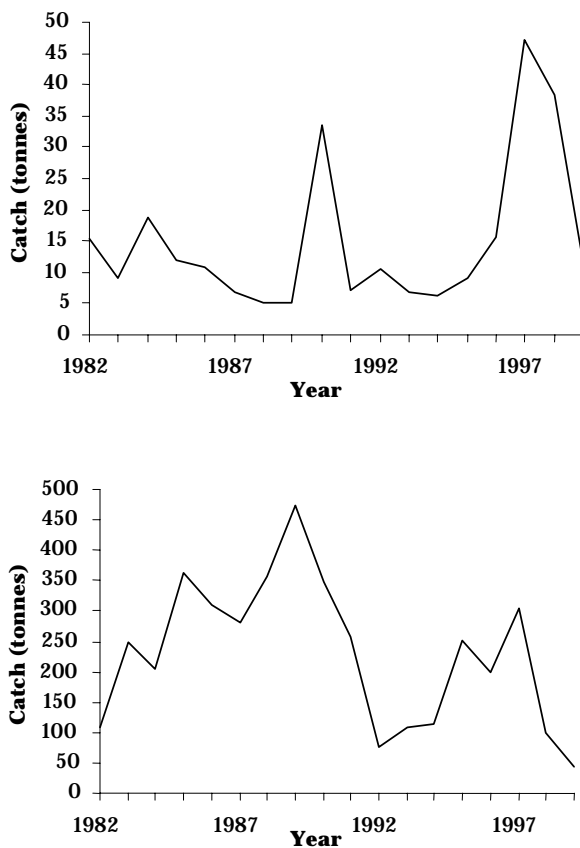


Figure 4. Catch of octopus (top panel) and *Loligo* spp. (bottom panel) in the Azores.

Octopus

Octopus (*Octopus vulgaris*) is collected by snorkel divers and iron traps. 95% of the total catch is landed in São Miguel and destined for local consumption. In theory, licenses are

mandatory, but the catch is largely unreported. For example, in Faial, one fisher out of 15 sells as much as 4 t a year in auctions. Carreira (2000), mentioned that 57.4 t of octopus was landed in São Miguel alone which would lead to a total of about 64 t for the whole Archipelago (Figure 4).

Small purse seine

Blue jack mackerel (*Trachurus picturatus*), chub mackerel (*Scomber japonicus*) and European pilchard (*Sardina pilchardus*) are caught with small purse seines pulled to shore or from small boats. This fishery is especially important around the Island of São Miguel. An average of 450 tonnes a year (range of 227 to 798 tonnes) are landed in the Archipelago.

Shrimp

Bottom traps are used to catch shrimp. The catch is generally used for local consumption, but it is largely unreported. To some extent this is still an experimental fishery. The principal species found in the area are *Plesionika narval*, *Plesionika edwardsii*, and *Heterocarpus* spp. (Martins and Hargreaves, 1991).

Limpet harvest

The limpet harvest peaked at 95 tonnes in 1984 and rapidly declined afterwards due to a possible 'limpet disease' in the 1980s and never recovered (Figure 5.). There are closed seasons and areas, some closed areas being 20 years old on some islands. The level of success varies between closures (Ferraz *et al.*, 2001).

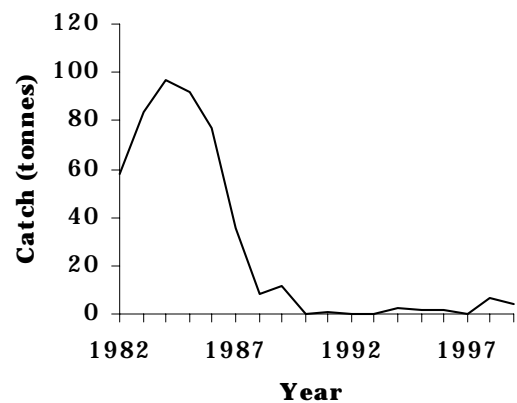


Figure 5. Catch of limpets (*Patella* sp.) in the Azores.

Experimental fisheries

Three new experimental fisheries have started, the trawl Orange Roughy (*Hoplostethus atlanticus*) fishery, deep water sharks ('sikis'), and deepwater crab, *Chaceon affinis*. Deepwater crabs are fished using traps (Pinho *et al.*, 2001). It is interesting to note that although Orange Roughy is thought to be abundant, experimental fishing with trawls around seamounts started only in the winter of 2001.

Artisanal fisheries

It is believed that at least 50% of the catch in this sector is unreported. Gillnets have been the object of a special study (Fontes *et al.*, 2000). Landings are difficult to estimate as catch reporting is poorly controlled, irrespective of the status of the fisher (with or without a permit). They catch mainly Atlantic bonito (*Sarda sarda*), yellowmouth barracuda (*Sphyraena viridensis*), thicklip grey mullet (*Chelon labrosus*), and some species only caught with gillnets, e.g., parrot fish (*Sparisoma cretense*) and salema (*Sarpa salpa*). The importance of gillnets in this sector is variable due to their bad reputation, and fishers often switch to hand lines. Early catches of gray triggerfish (*Balistes carolinensis*) were discarded and not reported. However, more recently a small scale fishery targeting this species has developed and is increasing in importance. This sector also includes spearfishing and rod fishing for Atlantic bonito, yellow-mouth barracuda and bluefish.

Recreational fishery

There appears to be no system to gather statistics from Azorean recreational fisheries. On the island of Faial there are 12 boats which troll for big game such as billfishes, blue marlin (*Makaira nigricans*), white marlin (*Tetrapturus albidus*), longbill spearfish (*Tetrapturus pfluegeri*), wahoo (*Acanthocybium solandri*), bluefin tuna, dolphinfish (*Coryphaena* spp.), Atlantic bonito and sharks. It has been noted that large fish are now becoming rare.

Shoreline recreational fishing with hook and line is not quantified and concerns several species among which *Diplodus sargus*, *Pagellus bogaraveo* and *P. acarne*, *Trachurus picturatus* and *Pagrus pagrus* are the most common species. These are followed by *Sparisoma cretense*, *Scomber japonicus*, *Serranus atricauda*, *Sphyraena viridensis*, *Pseudocaranx dentex* and *Pomatomus saltator* (listed in decreasing proportions: Pedro Afonso, University of the Azores, Horta, pers. comm.).

Seaweed harvest

The seaweed harvest, for food and agar production, is declining and very small.

ILLEGAL/UNREPORTED FISHING

Foreign boats from Spain, Taiwan and Japan come to seamounts north and south of the Azores and stay for a few days. They are rarely detected, but recreational fishing boats often see them. These boats often use unmarked monofilament gill nets and small drift nets which are abandoned when they are detected. A new Portuguese navy frigate has recently started fishery patrol duties, apparently improving the situation. In international waters just outside of the EEZ, vessels from Taiwan, Spain, Japan and France commonly set large drift nets. They catch many species of fish, marine mammals and seabirds. Estimates of illegal and unreported fishing have not yet been made.

COMPARISON WITH ICES DATA

Portuguese catches in the official ICES dataset (STATLANT) for Fisheries Statistical Area X includes both continental Portuguese and Azores vessel data (Figure 6). Comparison of ICES data with the Azores dataset shows that the total tonnages are similar (Figure 7). However, closer examination reveals that several species caught in small quantities are not reported separately in the ICES dataset (Appendix 1). These species may or may not have been included in the miscellaneous fish group which is very large in the ICES data set (Figure 8). Other species such as sharks have been included correctly in the ICES data set, but under larger categories, while the Azores file is more explicit and include *Lamna nasus*, *Dalatias licha*, *Isurus oxyrinchus* and *Hexanchus griseus* (Figure 9).

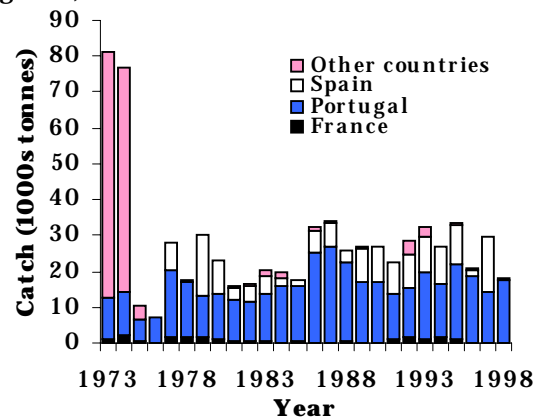


Figure 6. Catch by country in ICES Fisheries Statistical Area X. Other countries include USSR, Latvia, United Kingdom and the Faroe Islands. Data source: ICES STATLANT.

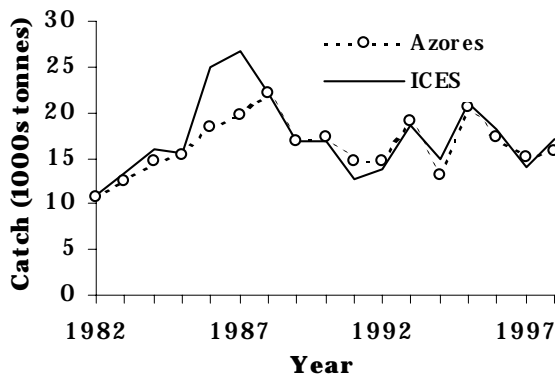


Figure 7. Comparison of ICES and Azores catch data in ICES Area X.

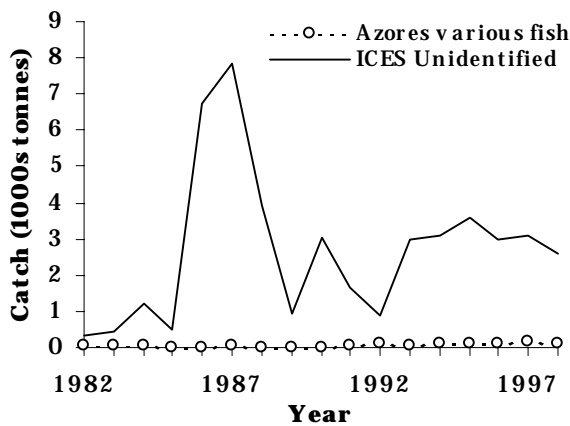


Figure 8. Comparison of Azores and ICES unidentified catches.

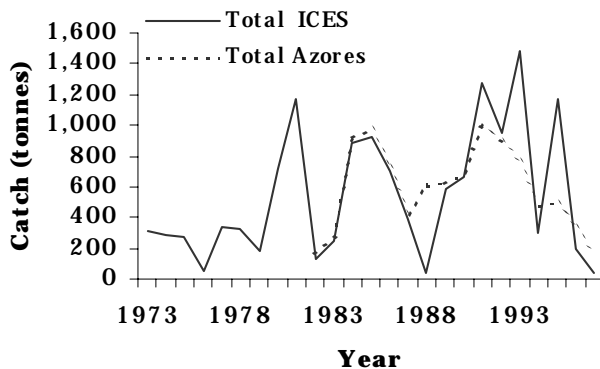


Figure 9. Composition of sharks catches in ICES and Azores data.

ACKNOWLEDGMENTS

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APPENDIX 1

List of species caught by Portugal for the period 1982-1999, and compared between ICES and Azores data sets. The list is not exhaustive.

Species that are absent from the ICES database (and the tonnage reported for these species in the Azores data set): *Cancer bellianus* (9 t), *Chelon labrosus* (15 t), *Coris julius* (14 t), *Coryphaena* spp. (mainly *C. hippurus*) (5 t), *Diplodus sargus cadenati* (45 t), *Epinephelus marginatus* (37 t), *Grapsus grapsus* (crab, 1.2 t), *Helicolenus dactylopterus* (386 t), Labridae (21 t), *Megabalanus tintinabulum* (1.4 t), Muraenidae (59 t), *Mycteroperca fusca* (0.41 t), *Patella* spp. (28 t), *Phycis phycis* (incl. *P. blennoides*) (354 t), *Pontinus kuhli* (59 t), *Pseudocaranx dentex* (13 t), *Ruvettus pretiosus* (2 t), *Sarpa sarpa* (43 t), *Scorpaena scrofa* (29 t), *Scyllarides latus* (0.7 t), *Seriola* spp. (23 t), *Sparisoma cretense* (16 t), *Sphyræna viridensis* (36 t), *Spondyliosoma cantharus* (2.3 t), *Thaio haemastoma* (0.6 t), *Trachinotus ovatus* (5.6 t), and *Trachurus picturatus* (2215 t).

Species present in the ICES database, but not in the Azores Data set: *Argyrosomus regius*, *Epinephelus guaza*, *Engraulis encrasicolus*, Gadiforms, *Merluccius merluccius*, *Pollachius pollachius*, *Scomber scombrus*, *Sparus aurata*, and *Trachurus trachurus* (could represent *T. picturatus*).

Species for which both datasets report the same catch: *Boops boops*, *Conger conger*, *Katsuwonus pelamis*, *Lepidopus caudatus*, *Loligo forbesi*, *Lophius piscatorius*, *Maja squinado*, *Mullus surmuletus*, *Octopus vulgaris*, and *Pagellus bogaraveo*.

For the following species/groups higher catches were reported in the ICES database than in the Azores data: Other crustacea, *Belone belone*, Mollusca, Tunas, and unidentified fish.

For the following species the ICES dataset was considered incomplete: *Aphanopus carbo*, *Beryx* spp., *Molva dypterygia*, *Pagellus acarne*, *Pagrus pagrus*, *Palinurus elephas*, *Phycis blennoides*, *Polyprion americanus*, *Pomatomus saltator*, and *Sarda sarda*.