

PROJECT Nº 95/081: STUDIES OF THE DISCARDS OF COMMERCIAL FISHERIES FROM THE SOUTH COAST OF PORTUGAL

KEY WORDS

Discards, by-catch, Portuguese fisheries, biological sampling, trophic interactions.

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OBJECTIVES

To increase knowledge of the effects of discarding by-catch at sea on marine community structure, trophic (feeding) interactions and stability. This involved the quantitative assessment of discard composition and mortality.

APPROACH AND METHODOLOGY

A variety of terms have been used in the literature relating to by-catch and discards. For the purpose of this study and to avoid different interpretations, the following definitions were presented:

- *Total catch* is the quantity of all species taken by the fishing gear.
- *Target species* is/are the commercial species caught intentionally.
- *By-catch* is defined as any organism caught unintentionally.
- *Discards* represent the portion of the catch that is not used and is thrown away at sea.
- *Retained catch* is part of the catch that reaches the deck of the fishing boat and is not thrown over board.
- *Landed catch* comprises the target and incidental species of commercial value that is brought ashore.

It was necessary to define 'retained catch' because of the observation that the species (quantified and/or identified) that reached the fishing boat deck and were not discarded, sometimes were not the same as the species landed. In addition, it was often not possible to obtain the official landing records of specific boats (landed catch).

The assessment of by-catches and discards in coastal fisheries has important biological and socio-economic considerations in the management of fisheries. Discards represent a loss in terms of production. This is particularly important when discards consist largely of juveniles of marketable species. The by-catch of juveniles may have a significant impact on recruitment to the commercial fishery. Discards of non-marketable species may represent losses in economic opportunities in cases where these could be used in the production of fish meal, fish oils, fish pastes, or other products.

The effects of the discarding at sea on marine community structure, trophic interactions, and stability are poorly known. However, there is some evidence that large quantities of discards may

have a significant impact on multi-species fisheries. With the increasing emphasis on multi-species or ecosystem-based management approaches, it is necessary to assess and quantify discard composition and mortality. The by-catch of rare and/or endangered species, particularly marine mammals, sea birds, and reptiles is an increasingly sensitive and important area, with implications for environmental impact, fisheries management and regulation.

An analysis of the literature showed that discarding was and is an important problem. Within the EC there was a great variation due to type of fishery, type of gear and socio-economic aspects. In Portugal, coastal fisheries employed a great variety of techniques ranging from industrial trawls to artisanal gears. The by-catches and discards of many of these fishing gears had not been studied in terms of composition, quantity, causes, possible impacts, and management implications. This was the first study on discards in Portuguese waters.

Since by definition discards are never landed, it was necessary to have observers on-board the fishing boats. This methodology allowed the researchers to get extra information, important not only for the statistical analyses, but also for the understanding of the reasons for discarding.

One or two observers were placed aboard every fishing boat sampled. Most of the fishing boats sampled were quite small, with limited space for the observers to work. To avoid any conflict with the work of the fishermen and to be able to do as much as possible with the discarded species, it was decided to take the discards to the laboratory for further analysis. In the case of relatively small amounts of discards, the entire catch of discards was brought back to the laboratory. When the quantity of discards was large, sub-samples were taken (15-30 kg) and estimates of the total amount of discards were made on-board. In this way, the composition of the discard catch could be made based on the sub-sample.

All species caught were classified by their frequency of rejection on a three point scale: 1 - occasional (species only occasionally discarded), 2 - frequent (species frequently discarded), 3 - regular (species always discarded).

During the sampling period of the study (March 1996 to June 1997) a total of 24 fishing vessels were sampled (6 crustacean trawls, 6 demersal purse-seiners, 3 otter trawlers, 3 pelagic purse-seiners and 6 trammel netters), with a total of 57 fishing trips and 128 hauls/sets.

MAIN FINDINGS AND CONCLUSIONS

A total of 236 species were identified and classified by the frequency of rejection and their occurrence (number of trips in which the species occurred) in the métiers studied. Most discard species were regularly discarded (139), followed by discard species frequently discarded (79). Very few were discard species were occasionally discarded (18).

The results of the study are given below for each of the gear types used in the study area:

Crustacean trawl:

Due to the nature of the target species, crustacean trawls (CT) are operated in deep-waters (more than 200 m and at average depths of 400-500 m).

The fish species that occurred most frequently in the CT sampled were: *Conger conger* (European conger eel) and *Micromesistius poutassou* (blue whiting), while invertebrate species included cephalopods *Illex coindetii* (short-fin squid), *Todaropsis eblanae* (lesser flying squid) and *Eledone cirrhosa* (curled octopus). In terms of total amounts discarded by weight the most important species were: dark electric ray *Torpedo nobiliana* (14.8%), dogfish *Scyliorhinus canicula* (14.6%), European conger eel *Conger conger* (10.4%), boar fish *Capros aper* (6.0%), European hake *Merluccius merluccius* (5.5%), short-fin squid *Illex coindetii* (5.1%) and blue whiting *Micromesistius poutassou* (4.8%).

The discard ratio for the CT was between 36% and 91%, with an average of 83%, during the study period.

Demersal purse-seine:

The demersal purse-seine (DPS) had the same characteristics as the pelagic purse-seine (PPS). The main difference was the size of the vessels operating them, with DPSs used by much smaller fishing boats. The size of the DPS boats sampled was between 13 and 17 m, while the PPS boats sampled were around 21 m. Another difference was that DPS fish at shallower depths near the coast, while PPS fish at greater depths further offshore. The main target species of the PPS was sardine, while for DPS a mixture of species were targeted. DPS fishing vessels are able to separate the fish on-board, while PPS do not separate the catch.

The fish species that occurred most frequently in DPS were *Sardina pilchardus* (European pilchard), *Scomber japonicus* (chub mackerel) and *Boops boops* (bogue). However, in terms of quantities discarded the grey mullet *Liza aurata* was the most important species with 66.2% of the total amount discarded, followed by *Scomber japonicus* (24.4%), *Boops boops* (2.9%) and *Sardina pilchardus* (2.6%).

The discard ratio for the DPS was between 1% and 86%, with an average of 35%, during the study period.

Otter trawl:

Several species of fish occurred significantly: *Capros aper* (boarfish), *Citharus linguatula* (spotted flounder), *Scomber japonicus* (chub mackerel), *Serranus hepatus* (brown comber), and others. In terms of total amounts discarded by weight, the most important species were: snipefish *Macrorhamphosus scalopax* (37.9%), chub mackerel *Scomber japonicus* (17.0%), boar fish *Capros aper* (14.8%), American john dory *Zenopsis conchifer* (5.0%) and bogue *Boops boops* (5.2%).

The discard ratio for the otter trawl was between 59% and 91%, with an average of 79%, during the study period.

Pelagic purse-seine:

The species of fish that occurred most frequently were *Sardina pilchardus* (European pilchard) and *Scomber japonicus* (chub mackerel). The most important species in terms of quantities discarded were bogue *Boops boops* (31.3%), chub mackerel *Scomber japonicus* (17.9%), garfish *Belone belone* (15.5%), European pilchard *Sardine pilchardus* (14.8%), snipefish *Macrorhamphosus scalopax* (10.7%), and Atlantic mackerel *Scomber scombrus* (5.5%).

The discard ratio for the PPS varied between 1% and 94%, with an average of 60%, during the study period.

Trammel net:

The species of fish that occurred most often were *Solea* spp (soles), seabreams (family Sparidae) and *Scomber japonicus* (chub mackerel). However, in terms of biomass discarded, the most important species was chub mackerel *Scomber japonicus* (57.8%), followed by European pilchard *Sardina pilchardus* (11.5%) and snipefish *Macrorhamphosus scolopax* (8.1%).

The discard ratios for the trammel net varied between 2% and 29%, with an average of 9%, during the study period.

Discard estimates:

The estimation of the total discards based on official landing statistics showed values for 1996 of 35,475 tonnes for the trawl fisheries, and 39,994 tonnes for the purse-seine fisheries. For the first

three months of the year 1997, the values were around 1,508 tonnes for the trawls, and 1,811 tonnes for the purse-seine.

Reasons for discards

Discarding was mainly due to low market value (e.g. the mackerels), no readily available market (e.g. snipefish), or due to damaged/poor quality fish (hake and common squid, etc).