DISCARDING AT SEA BY COMMERCIAL TRAWLERS IN GREEK WATERS

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Abstract
Discarding at sea by commercial trawlers was studied in the Cyclades area plateau and in the Saronikos Gulf, both being important fishing grounds of Greek Waters. Higher catch values, as well as discarding rates, appeared to the Cyclades. Fish, both marketable and discarded, dominated the catches of both areas. In the Cyclades, the majority of the discarded part, in terms of hourly yield, was mainly Chondrichthyes species. In the Saronikos, the bulk of the discarded fraction was composed of certain low demand species, among which *T. trachurus* dominated.

Key-words: Trawl surveys, fishes, Aegean Sea

Introduction

Discarding at sea is a serious problem in fisheries and a major source of uncertainty in management of resources. Estimates of fishing mortality, based on landings rather than catches, which include discards, are likely to be biased downward. Inclusion of discards when these are significant, will reduce the inaccuracies, especially of recruitment and improve the potential quality of assessments.

There is no information on numbers, weight and sizes of fish discarded by fishing vessels, other than extremely rough estimates, mainly from experimental surveys conducted by research Institutions. Data on discarding at sea by commercial trawlers in Greek waters were presented for the first time by Tsimenides *et al.* (1). The Saronikos Gulf and the Cyclades plateau are two major fishing grounds of Greek waters. The former is a semi-enclosed basin, that receives sewage effluents from Athens and the latter is an open sea area, larger and deeper than the Saronikos. The objective of this study, which is part of an EU project dealing with the analysis of trawl's discard operation in the Mediterranean Sea, is to report on the species that mainly contribute to the discarded part of the trawl catch and to assess the proportion of this part in relation to the total yield in the two areas.

Material and Methods

The fishing operations of two commercial trawlers in each study area in autumn 1995 were analysed, in order to obtain first estimates of the species composition, as well as the proportion of discards from trawl fishery. The selected trawlers were representative of the fishing fleet operating there; all four vessels had a 500 HP engine and were equipped with a trawl net having a cod-end mesh size of 14 mm from knot to knot. Data were collected from six hauls in each depth stratum (A: 0-150 m, B: 150-300 m, C: >300 m). For the Cyclades Islands data from 18 hauls were recorded, while in the Saronikos Gulf, the number of the hauls did not exceed 11 because of the bathymetry of the area (the greatest depth of the Saronikos Gulf is about 250 m, except for a very restricted area where it reaches 350 m). The number of hauls worked up per day usually varied from 1 to 3, depending on the depth, duration of the hauls, size of the catch, distance between the successive hauling positions and the prevailing weather conditions. Information regarding the haul characteristics (*e.g.* location, duration, depth) and concerning the quantity and quality of the catch in each haul was recorded. Data were grouped per depth stratum in each area and the catch composition, defining whether the collected species were characterized as marketable or discarded, was analysed. The percentage of the marketable and discarded fraction in relation to the total yield was also estimated. For comparative reasons raw catch values were transformed to hourly yield ones (g/h).

Results and Discussion

In the Cyclades, in stratum A and B total catches appeared to be greater than those in stratum C, where discarding rates exhibited the lowest value (Table 1). The majority of the discarded part consisted mainly of chondrichthyes (Raja, Scyliorhinus, Squalus, Oxynotus) reaching 19000 g/h in terms of mean hourly yield. In the Saronikos, mean total yield value was higher in the 150-300m depth zone, where the marketable fraction of the catch appeared also to be increased in relation to shallower waters. The bulk of the discarded volume was again fish, mainly *T. trachurus* (2116 g/h) and Scyliorhinus species (923 g/h). Between the two study areas, higher mean total catch values existed in the Cyclades. In the Saronikos discarding rates (%) displayed lower values.

Table 1. Mean total yield and relative proportion of discarded fraction in each stratum of the two study areas in October 1995.

AREA	STRATUM	Discarded yield			Total yield	
		g/h	%	std	g/h	std
CYCLADES	A	61959.2	59.2	61478.5	104707.2	63068.8
SARONIKOS		36049.8	53.3	11960.2	65797.4	19015.1
CYCLADES	B	79190.4	63.2	29546.2	125310.0	16775.4
SARONIKOS		44957.4	40.9	7506.0	110018.6	11845.0
CYCLADES	C	20564.8	36.7	8118.4	56098.0	12395.7

The percentage composition of the catch in the two areas, distinguished into four major taxonomic groups (*i.e.* fish, crustaceans, cephalopods, other invertebrates) is presented in Figure 1. Fish, both marketable and discarded, were the most important in terms of percentage weight (g/h) in all three strata of the Cyclades. The discarded part of fish was increased in stratum A and B. Regarding Crustaceans, in strata A and B almost all specimens, belonging mainly to Portunidae and Galatheidae were discarded, while the significant marketable portion appearing in stratum C was influenced by the presence of *Parapenaeus longirostris* and *Nephrops norvegicus*. In Cephalopods, constituting a limited portion of the total catch, the marketable fraction *(Sepia officinalis, Illex coindeti, Octopus vulgaris, Loligo vulgaris)* was more important in terms of percentage weight (g/h) as compared to the discarded one in all depth strata. Almost the whole part of the other invertebrates that were collected, belonged mainly to Echinoderma and especially Olothuria species, that were all discarded. In the Saronikos, fish species also dominated the catches. Discarded fish contributed more than the marketable ones to the percentage of the hourly yield in stratum A, while in deeper waters the marketable fraction was more important. The vast majority of the Saronikos catches mainly comprised *Trachurus* specimens, which influenced both the marketable and discarded portion of the catch. This was due to the fact that the species was either retained in relatively larger quantities, in cases when the rest of the marketable fraction was low, or discarded, either when the volume of the marketable species with significant commercial value was relatively high, or when the specimens were undersized (< 20 cm Total Length). The increased proportion of marketable crustaceans in both strata of the Saronikos was influenced by the significant presence of *P. longirostris*. Discarded crustaceans were mainly specimens of Munida sp. In relation to Cephalopods the greatest part was marketable. *I. Coindetii* and *Eledone* sp. were the most important in terms of hourly yield (g/h). Other invertebrates in the latter area, mainly Olothurians, were all discarded.

In order to investigate the contribution of the primarily commercial species to the marketable/discarded fraction of the trawl catch, the five most important species, in terms of both commercial value and abundance *(Merluccius merluccius, Mullus barbatus, Mullus surmuletus, Pagellus erythrinus* and *P. longirostris)* were considered as target species for the trawl fishery and were distinguished from all the rest (not-target species). In strata A and B the majority of the catch (54%) coincided with discarded not-target species (mainly Chondrichthyes species and then certain low demand ones such as *T. trachurus, Boops boops*), while marketable not-target species (mainly *Centracanthus cirrus, Dentex macrophthalmus, Pagellus bogaraveo*) exhibited a