

# ESTIMATES OF DISCARDS IN THE HELLENIC COMMERCIAL TRAWL FISHERY

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## Abstract

In the present work a first attempt is made to assess discards for the commercial trawl fishery in Hellenic waters. Overall, on-board sampling was conducted on 16 commercial trawlers for a total of 128 fishing days on 16 trawlers, carried out in 32 trips in four fishing areas during two fishing seasons (autumn-winter 1993, spring 1994). Our results showed that discarding is important for the Hellenic commercial trawl fishery and could be as high as 45% of the total trawl catch. Discard rates varied between species, areas and seasons and were found to be positively related to tow duration.

**Key-words:** Fisheries, Eastern Mediterranean

## Introduction

Discarding at sea, which is an important problem in fisheries and a major source of uncertainty in fisheries management, may result from economic constraints or from legal and administrative obligations imposed by the managerial scheme employed (1). Available studies have estimated the global discarded bycatch of fisheries at about 27 million t per year (2). The Mediterranean fisheries are highly diverse in terms of species and fishing gears used and are not managed based on TACs and quotas. Hence, discarding is perceived mainly as throwing away unmarketable species or species and size groups of low commercial value, because of legal obligations imposed by regulations on minimum landing sizes. Currently, there is not any information on numbers, weights and sizes of fish discarded by fishing vessels in the Eastern Mediterranean other than those derived from experimental surveys (e.g., 3). However, because the term "non-commercial" is subjective it cannot be applied to research vessel catches. In the present work a first attempt is made to assess discards for the commercial trawl fishery in Hellenic waters through on-board estimates.

## Material and methods

In the present study, the term "discards" refers to the part of the total catch of fish, molluscs and crustaceans that is thrown back into the sea (1) but not to organisms such as echinoderms, sponges and algae, even if some of them have a potential market value. Sampling took place in autumn-winter 1993 and spring 1994 in four regions (Fig. 1). The selected vessels: (a) were representative of the studied areas in terms of size and construction characteristics, (b) used the same cod-end mesh size, 14 mm bar length, and (c) have been operating routinely in the studied areas for many years. The selected areas are among the most important Hellenic fishing grounds (4). In addition, these areas are representative of major geographical fishing divisions,

Fig. 1. The four study areas

established by the National Statistical Service of Hellas, and for which yearly total estimates of landings are available (4).

Overall, on-board sampling was conducted during a total of 128 fishing days on 16 trawlers that carried out 32 trips in four fishing areas during two seasons. The following information was recorded on-board: (a) number and weight of total and retained catches and (b) number and weight per major non-commercial species discarded, commercial-undersized species discarded, and commercial species discarded. For data analysis, haul data were grouped on a daily basis, and the daily catch was treated as a single "sample". In addition, the lengths of discarded specimens of selected species were also measured on board (either by measuring all individuals if their total number was <80 or by measuring a representative sample). Length frequencies were subsequently raised to the haul total and then to the season total.

## Results

Overall, 49,960 kg were caught during 640 h of trawling (Table 1). Catches and discard and retained rates were all higher in the Thracian Sea and Saronikos Gulf than in the other two areas whereas the lowest values were recorded in the Ionian Sea.

The species composition by weight of the total catches differed greatly between areas and, to a lesser extent, between seasons. For Saronikos Gulf, the catches in autumn-winter 1993 were dominated by *Trachurus* spp. (12.1%), *Merluccius merluccius* (9.3%), cephalopods (6.2%), *Nephrops norvegicus* (6%), *Micromesistius poutassou* (5.8%), *Gadiculus argenteus*

TABLE 1. Trawl fishery, 1993-1994. Total catch in kg (TC), discard catch in kg (D), hours of trawling (H), total catch per hour (TC/H), discards per hour (D/H) and retained catch per hour (R/H) in the four study areas per season (AW = autumn-winter, SP = spring).

Area	Season	TC	D	H	TC/H	D/H	R/H
Saronikos	AW 1993	9442	5516	100.2	94.3	55.1	39.2
	SP 1994	8235	3448	93.4	88.2	36.9	51.2
Thracian	AW 1993	10272	3983	126.7	81.1	31.4	49.7
	SP 1994	7263	2974	68.0	106.8	43.7	63.0
Cyclades	AW 1993	3651	1270	50.3	72.5	25.2	47.3
	SP 1994	4320	1693	55.6	77.7	30.5	47.3
Ionian	AW 1993	2845	1219	68.8	41.3	17.7	23.6
	SP 1994	3932	1020	77.1	51.0	13.2	37.8

*argenteus* (4.9) and *Trisopterus minutus capelanus* (4.5%) whereas all remaining species each contributed less than 3%. In spring 1994, the catches were also dominated by *Trachurus* spp. (37.1%; mainly *T. mediterraneus*) and to a lesser degree by *M. merluccius* (9.3%), cephalopods (6.8%), *Mullus barbatus* (3.3%) and *M. poutassou* (3%) whereas all remaining species each contributed less than 3%.

For the Thracian Sea, the autumn-winter 1993 catches were dominated by *M. barbatus* (22.9%), followed by cephalopods (10.5%) and *M. merluccius* (3%) whereas all remaining species each contributed less than 3%. The spring 1994 catches were also dominated by *M. barbatus* (21.5%), followed by cephalopods (9.7%) and *M. merluccius* (3%), with the remaining species each contributing less than 3%.

For Cyclades, the autumn-winter 1993 catches were dominated by Decapoda (15.3%), *M. merluccius* (14.9%) and *T. mediterraneus* (14.4%), followed by *M. poutassou* (7.8%), cephalopods (4.8%), *Squalus acanthias* (4.8%), *Raja* spp. (3.9%) and *Argentina sphyraena* (3.3%). The spring 1994 catches were composed mainly of *T. mediterraneus* (21.8%), *M. merluccius* (15.6%) and Decapoda (14.4%), followed by *M. poutassou* (7.2%), cephalopods (7.1%), *M. barbatus* (4.6%) and *M. surmuletus* (4.1%) whereas all remaining species each contributed less than 3%.

The catches from the Ionian Sea in autumn-winter 1993 were dominated by *M. merluccius* (32.5%), followed by cephalopods (7.5%), *Boops boops* (4.5%), *M. barbatus* (4.1%) and *T. m. capelanus* (3%). The spring 1994 catches were also dominated by *M. merluccius* (24.2%), followed by *T. mediterraneus* (13.7%), *M. poutassou* (7.9%), *G. a. argenteus* (6.7%), shrimps (4.2%), *Raja* spp. (3.9%) and *Lophius budegassa* (3.3%) whereas all remaining species each contributed less than 3%.

The discard rate (i.e., discarded/total-catch) varied between areas and seasons, reflecting the differences in local market demand and species compositions (Fig. 2a). Hence, the discard rate in autumn-winter 1993 was highest in the Saronikos Gulf and lowest in Cyclades (Fig. 2a). In contrast, in spring 1994 the discard rate was similar for the Saronikos Gulf, Thracian Sea and Cyclades whereas it was lower in the Ionian Sea (Fig. 2a). The (commercial-discards)/(total-discards) ratio in both seasons was much lower in the Saronikos Gulf, Thracian and Ionian Seas (ranging from 0.02 to 0.42) than in Cyclades, where it was 0.70 (Fig. 2b). This indicates that in Cyclades most of the discarded specimens belonged to commercial species. *Anomura* (*Munida* and *Gallathea*) were the main invertebrates discarded. They made up an important component of the catches on an individual haul basis, ranging from about 5% in Cyclades to about 35% in the Saronikos Gulf. With respect to fishes, the main non-commercial species discarded were *Serranus hepatus*, which made up 1.3% in the Saronikos Gulf, 2.2% in the Thracian Sea and 0-0.1% in Cyclades and Ionian Sea; and *G. a. argenteus*, which made up 1.6-4.9% in the Saronikos Gulf, 1.9-2.2% in Cyclades and 0.2-6.7% in the Ionian Sea. The following non-com-