

FACTORS AFFECTING DISCARDING IN THE EAST MEDITERRANEAN TRAWL FISHERY

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Abstract

Analysis of data from on-site sampling of trawl fisheries in the central Aegean by observers on-board fishing vessels was conducted to determine the relative importance of certain factors (fishing and temporal) affecting discarding. A significant positive correlation was found to exist between the mean discards and the mean catch weight. Catch quantities and species composition in the catch appeared to have the highest impact on discard patterns.

Keywords: Aegean Sea, Demersal, Fisheries

Introduction

Discarding at sea occurs mainly in multi-species fisheries, such as those operated in the Mediterranean, where it is perceived mainly as throwing away unmarketable by-catch species, and/or undersized individuals of target species. In Greek waters, higher amounts of discards are generated by bottom trawlers [1], and total quantities produced annually have been estimated to range between 13,500 and 22,000 t [2]. Understanding the factors that determine what and how much is discarded is fundamental if we are to propose mitigation tools for fisheries management [3]. This study aims to contribute to the knowledge of discarding patterns and factors affecting them in east Mediterranean trawl fisheries.

Material and Methods

Data analysis was based on fishery records taken in 2004 and 2005 by observers on-board commercial trawlers on quarterly intervals except for the summer, when according to the Greek legislation trawlers operation is prohibited. All vessels were operating routinely in the central Aegean Sea and they were distinguished into two different segments on the basis of their size ($\geq 24\text{m}$ and $< 24\text{m}$). Fieldwork at each haul comprised the recording of the fishing duration, the species composition and the total catch. Then for each species, values of both the marketable and the discarded fraction of the catch, number of fish, total weight and fish length were recorded. Haul data were subsequently aggregated at the daily trip level, mean values per fishing hour of discards and catch weight were estimated and further analysed through General Linear Model Analysis of Variance (GLM ANOVA). The dependent variable was the mean absolute values of discards per fishing hour; the fixed factors were the fleet segment, the species caught and the quarter of the year; the mean total catch per fishing hour was used as a covariate. The impact of each significant source of variation was studied through the value of partial η^2 (higher η^2 value implies higher effect).

Results and Discussion

Our results showed that on average 36.6% of the trawl catch was discarded per fishing trip. The latter value is lower than the mean discarded quantity mentioned in a previous study in Greek waters [2] and is possibly related to the implementation of the 40 mm cod-end mesh size in trawls the last few years. In the North Sea the introduction of certain technical measures which included increases to cod-end mesh size have been proven effective in reducing discards [4]. On the other hand, in the Baltic Sea cod fishery the enforcement of gear related technical measures was not successful due to poor compliance by fishers who did not accept the subsequent large short-term catch losses [5].

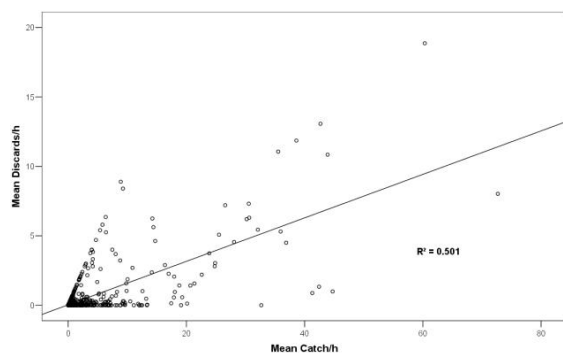


Fig. 1. Relation between mean discards and mean catch per hour (in kg) from trawlers in Central Aegean in 2004-5 by trip sampled.

Great variation appeared between mean discards and mean catch portions among trips, although a significant positive correlation ($r=0.708$, $p<0.05$) was found between the two parameters (Fig.1). Similar results were obtained in other studies [2], [6], while there were also cases where discard rates were found to be unrelated to the amount caught [7]. GLM ANOVA results revealed that the factors used in the current analysis explained about 75% of the total variability of discard quantities (Table 1). Mean catch per hour had the highest impact on discards (partial $\eta^2 = 0.418$). Concerning the main effects in the model, species had a higher impact than quarter of the year and fleet segment. Discard patterns can be highly variable and are initially affected by catch compositions, which are determined by environmental and social (regulatory, behavioural) factors, but are ultimately controlled by the fishing vessel crews, who are influenced by landing constraints and economic forces [8].

Tab. 1. GLM ANOVA results for trawl discards in the central Aegean Sea in 2004-5

Tests of Between-Subjects Effects						
Dependent Variable: Mean Discards/h						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Model	1524.347 ^a	117	13.029	16.572	.000	.755
species	65.375	19	3.441	4.377	.000	.117
segment	4.391	1	4.391	5.585	.018	.009
quarter	10.698	2	5.349	6.803	.001	.021
mean catch /h	355.098	1	355.098	451.666	.000	.418
species * segment	35.158	19	1.850	2.354	.001	.066
species * quarter	122.754	38	3.230	4.109	.000	.199
segment * quarter	7.909	2	3.954	5.030	.007	.016
species * segment * quarter	93.177	34	2.740	3.486	.000	.159
Error	493.732	628	.786			
Total	2018.079	745				

a. R Squared = .755 (Adjusted R Squared = .710)

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