

YIELDS, BYCATCH AND DISCARDS IN THE *MULLUS SURMULETUS* GILLNET FISHERY OFF SOUTHEASTERN MALLORCA (WESTERN MEDITERRANEAN)

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Summary

This is the first of a series of studies of the artisanal fisheries of the Balearic Islands (Western Mediterranean) that aim to evaluate their efficiency, yields and ecosystem impacts. Here we present results of the striped red mullet (*Mullus surmuletus*) gillnet fishery carried out during 1999-2001 off Southeastern Mallorca Island. The efficiency of the fishery was high with commercialised species making up 99% of the total catch in number. However, the selectivity of the fishery was low and over 40 bycatch species of fishes and molluscs were subject to unaccounted fishing mortality.

Key words: Bycatch, discards, gillnet, fishing impacts, *Mullus surmuletus*

Introduction

One of the ecological costs of fishing is the incidental catch of organisms which are not target of the fisheries (1,2). Many current fishing methods are highly indiscriminate and result in the catch of non-target species or of undesirable sizes of target species which are then discarded back to the water. Knowledge of bycatch and discard practices in large-scale fisheries has grown in parallel with this awareness (2,3) and in the Western Mediterranean studies have focused on bottom trawl fisheries (4). Artisanal fisheries are generally perceived as low impact, highly efficient fisheries that generate few if any discards. The prevalence of artisanal fisheries in the Western Mediterranean, and in the Balearic Islands in particular, has prompted a series of studies aimed at assessing their efficiency and ecosystem impacts by investigating the relationship of the yield of target and non target organisms as well as the bycatch and discard practices. Here we present the results of the first study conducted on the striped red mullet (*Mullus surmuletus*) gillnet fishery off Southeastern Mallorca Island (Western Mediterranean).

Material and methods

Data were collected on board artisanal vessels participating in the autumn *M. surmuletus* gillnet fishery. The fishery takes place at sunset and at sunrise when gillnets are set over *Posidonia*/sand substrates for periods of 2-3 hours. The stretched mesh size of the netting is 35-40mm and gillnets are 500-1000m long.

Data from 48 valid fishing operations sampled randomly during the 1999-2001 seasons were used in the study. Information was collected on fishing effort (length of net, fishing time) and on the retained and discarded catch. For each species we calculated the yield (expressed as the number of individuals caught in 500m) in the retained and discarded fractions, and their percentage contribution to the catch. To assess the fishery and ecological efficiency of the fishery, for each fishing set the following indices were calculated: a) target species index= number of retained *M. surmuletus*/total number of specimens caught; b) fishery index= number of specimens retained/total number of specimens caught; c) bycatch index= number of bycatch specimens/number of *M. surmuletus* caught; and d) discard index= number of discarded specimens/number of *M. surmuletus* caught.

Results and discussion

Forty-two species were caught (39 fishes and 3 molluscs), 40 of which were retained in at least one occasion (commercial bycatch). *M. surmuletus* made up 47.7% of the catch in number and the mean yield was 38.0 (± 5.2 SE). The commercial bycatch made up 50.9% of the catch in number and the mean yield was 44.6 (± 7.9 SE). The main bycatch species were the fishes *Diplodus annularis*, *Spicara maena*, *Diplodus vulgaris*, and *Serranus scriba*, all of commercial value.

Twelve species were discarded at least in one occasion, and the discarded fraction was 1.4% in number. *M. surmuletus* were discarded in 19% of the fishing sets and made up the largest fraction of the discards (42.8% in number). Reasons for discarding were: damages caused by bites of dolphins or other organisms (e.g. *M. surmuletus*, *Pagrus pagrus*, *Symphodus tinca*, *Scorpaena notata*), low or nil market value (e.g. *Synodus saurus*, *Sarpa salpa*, *Chromis chromis*) and size below the legal limit (*Epinephelus costae* and *Scorpaena scrofa*).

The target species index was 0.46 (± 0.03 SE), indicating a relatively high efficiency of the fishery for *M. surmuletus* when compared with other artisanal fisheries, such as cuttlefish trammel net fishery off

Greece where cuttlefish made up 31% of the catch (5). The fishery index was 0.99 (± 0.003 SE) and shows that overall the fishery is highly efficient and produces low waste. The estimated bycatch (2.3 \pm 0.5 SE) and discard (0.03 \pm 0.01 SE) indices illustrate that on average for every *M. surmuletus* caught 2.3 non-target organisms must be fished of which 0.03 are discarded. Both in absolute terms and when compared with discard rates of 25% in bottom-trawl fisheries in the Western Mediterranean (4), or of 15-25% in gillnet and longline fisheries in the Northeast Atlantic (6), these values appear very low.

The good outlook of this fishery in terms of its low discard rates should not hide the fact that its species selectivity is low as the fishery impacts 41 bycatch species of fishes and molluscs. These species are subject to unknown and unaccounted levels of fishing mortality while little to nothing is known about the status of their populations. Further assessments of the efficiency and ecological impacts of artisanal fisheries will consider the resilience of the bycatch species and strive to incorporate the impacts on taxonomic groups that have no market value and are generally not considered in these studies.

References

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