

MICROPLASTIC INGESTION IN COMMERCIAL FISH SPECIES *BOOPS BOOPS*, *SARDINA PILCHARDUS* AND *ENGRAULIS ENCRASICOLUS* IN THE WESTERN MEDITERRANEAN SEA: MEDIAS SURVEY

Montserrat Compa Ferrer ^{1*}, Ana Ventero ¹, Magdalena Iglesias ¹ and Salud Deudero ¹

¹ Instituto Español de Oceanografía. Centro Oceanográfico de Baleares. - montse.compa@ba.ieo.es

Abstract

Microplastic ingestion was assessed for three commercial fish species in the western Mediterranean Sea: *Boops boops*, *Sardina pilchardus* and *Engraulis encrasicolus* during the 2015 Spanish MEDIAS survey. Gastrointestinal tracts of 183 fish from 16 sites were examined. A total of 42 microplastics were found in the stomach contents of 31 individuals from all three species. *B. boops* was found to have ingested the most items (27%). No significant differences between abundance of ingested microplastics and spatial distribution of the sites were found, although it does appear microplastics are common in the food web of each species along the eastern coast of Spain.

Keywords *Plastics, Pollution, Food webs, Mediterranean Sea, Fisheries*

Introduction

Marine plastic is found floating on the surface, suspended in the water column, and/or deposited on the seafloor, which overtime breaks down into microplastics (MPs) resulting in the accidental ingestion by marine fauna, especially fish [1,2]. This study aims to describe the presence of MPs in the gastrointestinal tract of three commercial fish species and evaluate the abundance of ingested MPs between species and spatial variation between sites along the eastern coast of Spain.

Methods and materials

Three commercial fish species were sampled for MPs: *Boops boops*, *Sardina pilchardus* and *Engraulis encrasicolus* at 16 sites during the oceanographic cruise MEDIAS (Mediterranean International Acoustic Survey) in 2015 which lies within the European Data Collection Regulation framework to estimate abundance and biomass of fish stocks. Measurements for length (mm), body weight (mg) and sex (male/female/undetermined) for each fish was recorded and the gastrointestinal tract was removed by dissection and immediately frozen onboard the research vessel. Once in the laboratory, samples were defrosted at room temperature and inspected using a dissection microscope. To prevent environmental contamination, protocols were adapted from previous studies to reduce risk [2]. Ingested MPs data was not normally distributed and variances were not equal, non-parametric Kruskal-Wallis rank sum tests (KW) were performed on species and sites. Analyses were performed using RStudio.

Results and discussion

The amount of individuals found with MPs at each site shows how abundant MPs are in the food web in the western Mediterranean Sea (Figure 1).

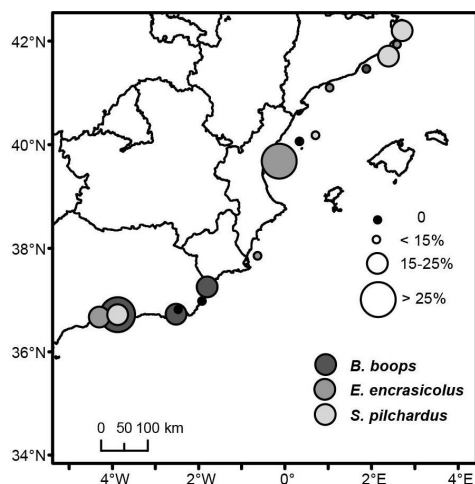


Fig 1 Sites sampled for ingested microplastics in commercial fish species. Bubble size indicates percent of individuals of each species found with ingested

microplastics surveyed at that particular site.

Out of the 183 gastrointestinal tracts examined, 17% were found to have MPs (all of which were fibers) and *B. boops* was found to have ingested the most (27%). Average number of items found per fish containing plastics in each species was the following: *B. boops* = 1.46 ± 0.66 , *S. pilchardus* = 1.43 ± 0.79 and *E. encrasicolus* = 1.18 ± 0.40 (Figure 2). There were no significant differences in ingestion between all individuals (KW, $n = 183$, $P = 0.136$) or ingestion between all sampled sites (KW, $n = 16$, $P = 0.052$). Although no significant difference was found, small quantities of MPs were common in the food web of each of the commercial fish species sampled, similar to results found in demersal and pelagic fish species [2]. With the growing concern for marine health and public safety due to MPs, the results indicate the presence of MPs in these commercial fish species along the entire eastern coast of Spain.

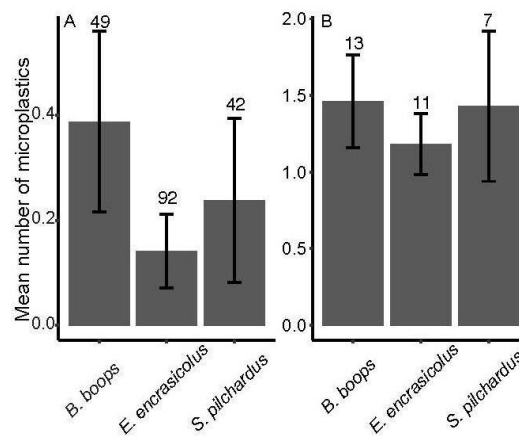


Fig 2 Mean number of microplastic items in all individuals (A) and in individuals containing plastics (B). Error bars indicate standard deviation and numbers above error bars indicate number of individuals examined.

References

- Choy, C A and Drazen, J C, 2013. Plastic for dinner? Observations of frequent debris ingestion by pelagic predatory fishes from the central North Pacific. *Marine Ecology Progress Series*, 485, pp 155-163.
- Lusher, A L, McHugh, M and Thompson, R C, 2013. Occurrence of microplastics in the gastrointestinal tract of pelagic and demersal fish from the English Channel. *Marine pollution bulletin*, 67(1), pp 94-99.