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[\*\*A holistic approach to plastic pollution in integrated multi-trophic aquaculture facilities: Plastic ingestion in \*Sparus aurata\* and \*Mytilus galloprovincialis\*\*\*](#)

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**Abstract:** Due to the rise in aquaculture production, a global increase in Integrated Multi-Trophic Aquaculture Systems (IMTA) combining species and optimizing niches is expected to mitigate environmental impacts. However, these facilities are currently composed of plastic materials that can directly or indirectly be released into the marine environment and become available for reared species such as fish and mussels. This study aims to contribute to the quantification of plastics from IMTA systems with a holistic approach. For this purpose, we evaluated plastic ingestion in two edible species ( *Sparus aurata* and *Mytilus galloprovincialis*) from sea-based experimental aquaculture facilities in Mallorca, as well as plastic loads in the surrounding surface waters. Plastics were observed at the IMTA system in 33% of *Sparus aurata* samples, 94% of *Mytilus galloprovincialis* samples, and 100% of sea surface water samples. Plastic ingestion was approximately twice as high in filter feeder mussels as in fish. Additionally, the type and composition of ingested particles differed between species; fish ingested up to 70% films and filaments of HDPE and LDPE, while mussels ingested 97% fibers composed of cellulose acetate. Our results suggest that bioindicator species such as *S. aurata* and *M. galloprovincialis*

should be included in monitoring programs of aquaculture facilities to better understand the fate of plastics derived from these practices.

Keywords: Bioindicators, Environmental assessment, Plastic pollution, Aquaculture, Mussels, Fish, Sea surface