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# Degradation and ecotoxicity of new and used fishing nets. First results of a research project in the south-eastern Bay of Biscay

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## Abstract

After more than 30 years of research on plastic pollution, data on sources and ecotoxicity are still fragmentary. Several studies have suggested that fishing gear (FG) is a major source of secondary micro and nanoplastics (MNPs). In this context, we focused our research on the MNPs and additives coming from the degradation of plastic FG during their life cycle, especially those used in the south-eastern Bay of Biscay (BoB) (PLASFITO project). First, a protocol using UV irradiation and water agitation was set up to artificially age fishing nets (FNs). Then the Microtox® test using the marine bacteria *Aliivibrio fischeri* was conducted to screen the ecotoxicity of FN leachates. The study was conducted on three conventional gillnets made of polyamide (PA) with different additive compositions, one in-development gillnet made of bio-sourced and biodegradable polybutylene succinate (PBS),

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and one polyethylene (PE) trawl net. Each experiment was conducted on new and used FNs. Artificial ageing caused structural and morphological modifications of the polymers, revealed by FTIR-ATR, RAMAN and SEM, and induced the release of MNPs into the water. The produced particles were not only fibres, as expected, but were mainly micro fragments. The degradation kinetics differed between FNs depending on the different polymers and especially on the additives' composition. Results of the Microtox® test revealed significant toxicity of some FNs' leachates (PA and PBS). However, because the effects on *Aliivibrio fischeri* were not the same for all the PA FNs, we assume that the toxicity depended on the additives' composition and also on the wear of the FNs. The emphasis on the environmental toxicity of new ready-for-use FNs and the possible major role of additives raise concerns about the potential risks of certain FNs for marine organisms. Experiments are underway to better understand the overall contribution of these FNs to marine plastic pollution.

**Keywords:** Fishing nets / Degradation / Ecotoxicity / Additives