



Composition and Spatial Distribution of Litter on the Seafloor

MSFD Descriptor: 10 - Marine litter

MSFD Criterion: 10.1 - Characteristics of litter in the marine and coastal environment



Key Message Litter is widespread on the seafloor across the area assessed, with plastic the predominant material encountered. Higher amounts of litter are found in the Eastern Bay of Biscay, Southern Celtic Seas and English Channel than in the northern Greater North Sea and Celtic Seas

Background

Marine litter is a global problem, with increasing quantities of litter documented in recent decades. The abundance of seafloor litter is influenced by anthropogenic inputs, including litter transported by rivers and ocean currents, which can redistribute this material over long distances. Marine litter is therefore a transboundary problem.

Marine animals can ingest or become entangled in litter (e.g. discarded fishing gear, strapping bands) on or near the seafloor. This could result in death or injury, for example through suffocation or starvation. Plastic items are potential vectors for contaminants and can also scour or smother the seafloor. This can impact on fragile benthic habitats, reducing photosynthesis and preventing the movement of animals, gases and nutrients. Marine litter also acts as a vector for invasive species, transporting non-indigenous organisms into new areas where they can out compete or prey upon native organisms.

Litter on the seafloor has been studied in both coastal waters and the deep sea. The presence of large amounts of plastic litter has been reported on the European continental shelf. Benthic trawl surveys are a practical way to monitor seafloor litter (on the continental shelf), because they are already in use for fish stock assessments, cover a wide area of seafloor and collect a sufficient quantity of litter for analysis.

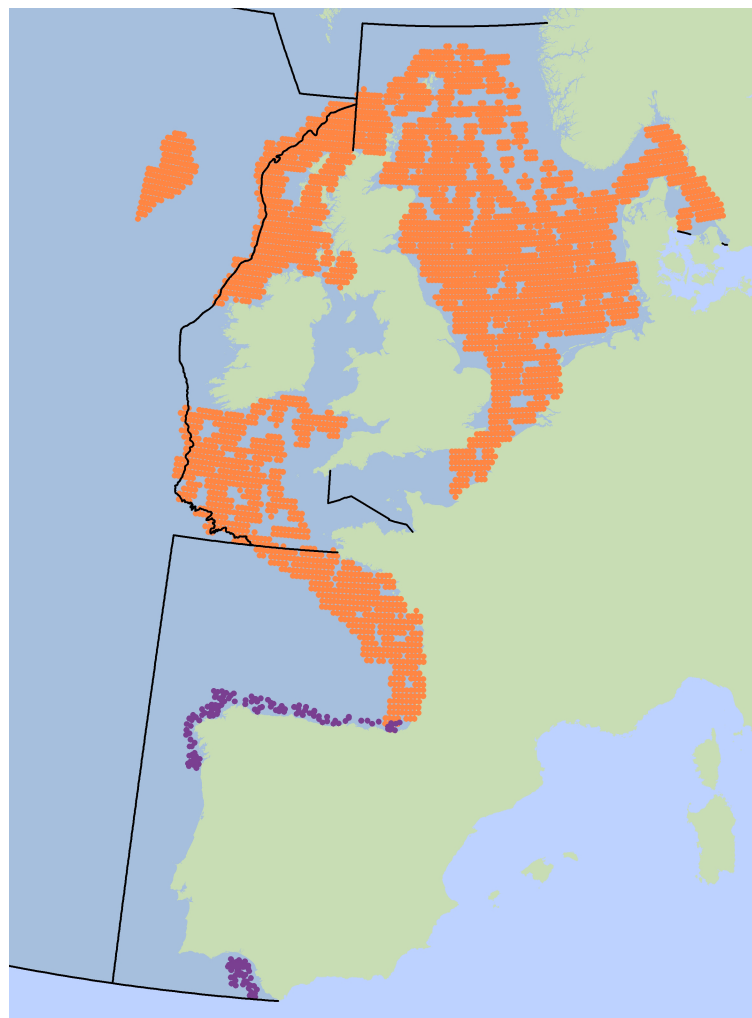


Figure 1: Stations used for assessing seafloor litter. Greater North Sea, Celtic Seas and the Eastern Bay of Biscay (GOV; orange) and the Iberian Coast and Gulf of Cadiz (BAK; purple) haul locations

Results

The distribution and abundance of marine litter on the seafloor in the OSPAR Maritime Area were investigated on the basis of data collected by trawl surveys from seven Contracting Parties (**Figure 1**). Benthic trawls are designed to capture marine biota on or near the seafloor over a range of different seafloor types. As a result, some trawl designs plough through the seafloor while others roll over the seafloor. The amount of litter captured during a survey is influenced by the type of interaction with the seafloor and the mesh size of the nets. Therefore, the sampled quantities are not absolute amounts, but 'relative' amounts. However, they still allow comparisons between regions sampled with similar gear. The number of stations monitored determines the confidence that can be applied to assessments and defines the time (number of years of data) needed to obtain an acceptable confidence level.

Widespread distribution of litter items, especially plastics, was discovered on the seafloor of the Greater North Sea, the Celtic Sea, the Bay of Biscay, the Iberian Coast and the Gulf of Cadiz. The assessment mostly focuses on the Greater North Sea, Celtic Seas and Eastern Bay of Biscay (excluding the Iberian Coast and the Gulf of Cadiz) which were sampled with a Grande Ouverture Verticale (GOV) trawl. For this area, the abundance of litter items (litter items per km²) on the seafloor increases from north to south (**Figure 2**). In 2014, of all litter items recorded the percentage of plastic items was 68% for the Greater North Sea, 58% for the Celtic Sea and 98% for the Eastern Bay of Biscay. Nearly all trawls in the Eastern Bay of Biscay contained at least one plastic item; the area also has the highest levels of recorded litter within the assessment area.

It was not possible to directly compare the results for the Greater North Sea and Celtic Seas, which used a GOV trawl, with the results of the assessment of the Iberian Coast and Gulf of Cadiz, which were sampled with a BAK otter trawl (**Figure 2**). A map of relative abundance of litter items for the Iberian coast and Gulf of Cadiz, similar to **Figure 2** could not be created as the samples were clustered near the coast, due to the topography.

There is moderate confidence in the methodology and low to moderate confidence in the data.

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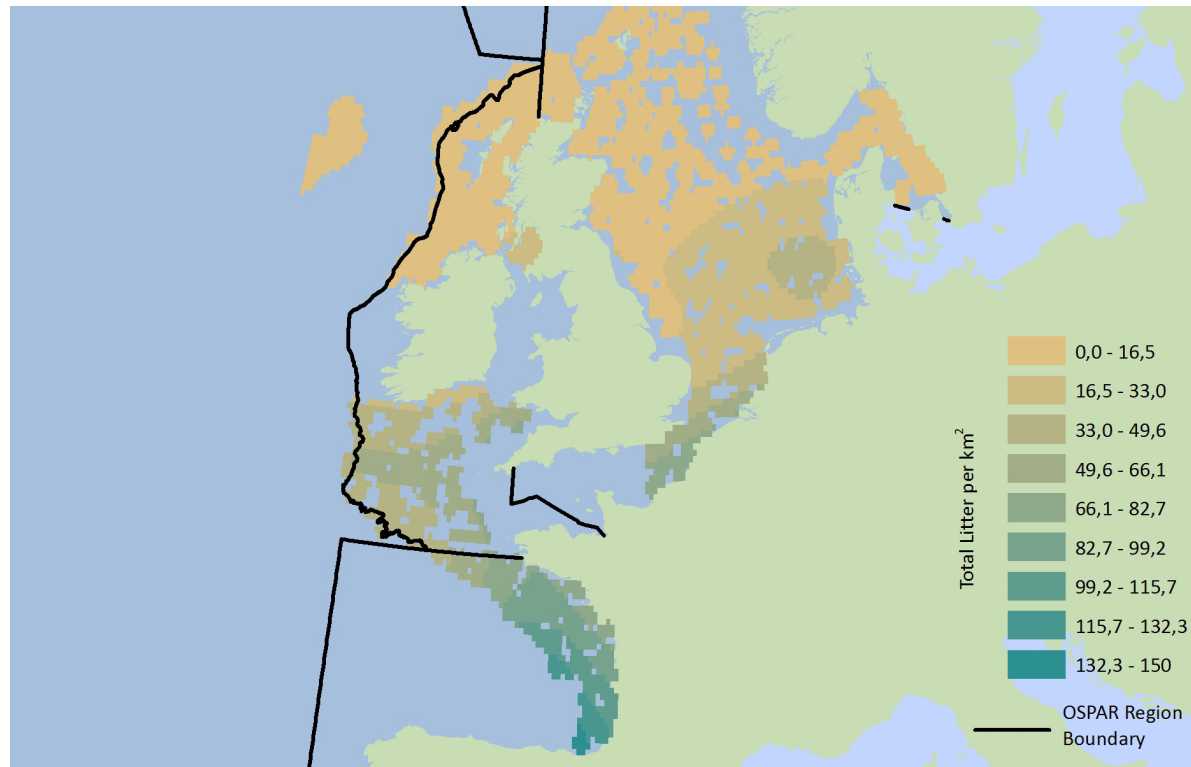


Figure 2: Relative number of litter items per km² seafloor across the Greater North Sea, Celtic Seas and the Eastern Bay of Biscay, based on the number of items caught as by-catch in fisheries trawls.

Conclusion

Litter is widespread on the seafloor across the areas assessed, with plastic the predominant material encountered. In the areas assessed, higher amounts of litter and plastic are found in the eastern Bay of Biscay, southern Celtic Sea and English Channel than in the northern Greater North Sea and Celtic Seas. This could be due to larger anthropogenic inputs, rivers, prevailing winds and / or currents. Previous studies have shown the Bay of Biscay to receive large amounts of litter from local rivers and transport that may result from large-scale circulation in the sub-region as a whole. Floating and sinking litter follow different pathways, and gather in different hotspots, which do not necessarily overlap. For example, the beach litter hotspot in the Skagerrak is not replicated in the seafloor litter. For most of the OSPAR regions, except the Greater North Sea, more survey stations or longer datasets are needed in order to detect a significant change in the abundance of seafloor litter. The OSPAR Regional Action Plan identifies actions to reduce marine litter and should lead to a reduction in seafloor litter.

Knowledge Gaps

There are a number of areas where further knowledge could improve the assessment. Information concerning seasonal influences, weather patterns and changes in currents, all of which could affect the distribution of litter, are not taken into account. Although only surveys using similar gear are used, the sampling design could also have an influence (fixed and random stratified sampling stations). Furthermore, there is a need to compare how different gear types capture litter (e.g. GOV and BAK trawls) if relative amounts of litter per km² are to be compared across the whole region in the future. Several data issues slowed down the assessment and these could be improved in following years.



Image: Marine litter by-catch on board the RV Endeavour © J. Thain

This document was published as part of OSPAR's Intermediate Assessment 2017. The full assessment can be found at www.ospar.org/assessments