Sea floor litter

Scottish Government
Riaghaltas na h-Alba
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12 RESPONSIBLE CONSUMPTION AND PRODUCTION

14 LIFE BELOW WATER

Key message

Sea-floor litter, mainly plastics, was observed in 44% of trawls. The highest densities occur in the North Sea and the lowest offshore to the west of Scotland. There is evidence of an apparent decrease in litter density over time for some areas.

Litter from the seabed. photo by M. Russel.MSS

Background

The amount of litter in the earth's seas has increased substantially over recent decades and is of international concern. Such litter harms sea-life, has economic consequences, and is a risk to human safety. Of particular concern are persistent plastics, which may float, remain in suspension, sink to the sea-floor, or be ingested by marine life. This litter originates from human activities at sea and on land.

The monitoring of litter on the sea-floor is required under international agreement and domestic legislation. Additionally the United Nations (UN) General Assembly Sustainable Development Goals, which the Scottish Government is incorporating into its National Outcomes, aspire to prevent and significantly reduce marine litter.

Counts of the number of pieces of marine litter, collected during trawls for sea-floor living fish, are available from scientific expeditions carried out by the Scottish Government's Marine Research Vessel (MRV) ***Scotia*** between 2012 and 2018 inclusive. These data are supplemented with similar data from the research vessels of other nations operating within a similar area. The litter data have been statistically analysed to generate information on the density of sea-floor litter in the seas around Scotland.

For further information on this topic go to: https://marine.gov.scot/sma/assessment/sea-floor-litter

Results

A total of 1,533 items of litter were recorded from the 1,635 sea-floor trawls in the seas around Scotland between 2012 and 2018 inclusive. Litter was observed in 44% of trawls, which usually contained one (53%) or two (24%) items with a maximum of 18. The majority of litter items (74%) were categorised as plastic (Table 1).

Category	Number	Percentage
Plastic	1,135	74
Rubber	127	8
Natural Products & Clothes	92	6
Metals	90	6
Glass & Ceramics	16	1
Miscillanious	73	5

Table 1:
Observed counts of categorised litter within the Scottish Zone from 2012 to 2018 inclusive.

A spatial map of averaged modelled sea-floor litter densities in the seas between 2016 and 2018 inclusive is presented in Figure 1. The results indicate that:

- the highest densities occur in the North Sea;
- the lowest densities occur off-shore to the west of Scotland.

It is likely that additional spatial changes in density are, to at least some extent, a consequence of the different trawl ground-gears used for sampling and/or statistical modelling artefacts such as edge effects.

The spatial map shows modelled sea-floor litter densities averaged over 2016 to 2018 inclusive, with biogeographic regions denoted by dotted internal boundaries, and areas distant from survey trawls by stippling. The temporal graphs show changes in modelled average density with 95% confidence intervals for each region from 2012 to 2018, together with a linear trend over time with 95% confidence intervals.

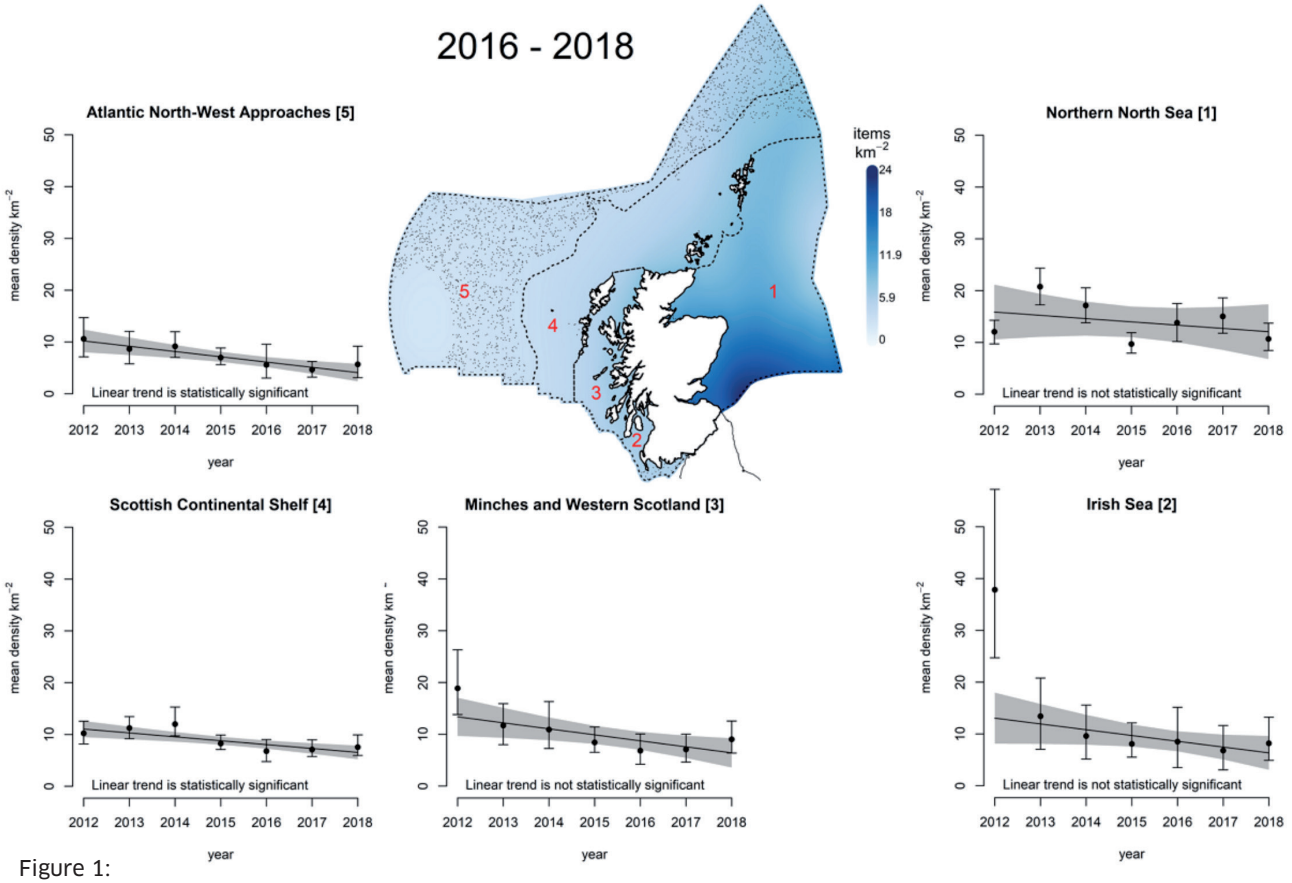


Figure 1:
Sea-floor litter densities (items km-2) for the Scottish Zone.

Temporal graphs of annual average modelled sea-floor litter densities, with a measure of uncertainty, for each of five areas in the seas around Scotland are presented (Figure 1). These indicate apparent decreases in sea-floor litter density over time for the Scottish Continental Shelf and Atlantic North-West Approaches. The reasons for these apparent decreases over time are not known. Some possible explanations include decreased litter inputs relative to degradation and removal, fragmentation of litter to sizes less efficiently captured and/or retained by the trawl gear, transport of litter to areas which are not surveyed, and, given the short time-frame, an artefact of sampling and/or analysis.

Conclusion

Sea-floor litter, the majority comprising plastic items, was observed in 44% of trawls undertaken in the seas around Scotland. In recent years the highest densities occurred in the North Sea, and the lowest in off-shore waters to the west of Scotland.

There is evidence of an apparent decrease in sea-floor litter density between 2012 and 2018 in areas distant from large population centres. There are several possible explanations for this.

Knowledge gaps

The sea-floor litter data were collected during international scientific surveys assessing commercial sea-floor living fish stocks. Trawls take place in areas suited to such fishing and omit deep seas, coastlines, and rocky areas. Likewise the equipment is designed to capture fish rather than litter. The results are, therefore, relative sea-floor litter distributions and are affected by unquantified amounts of sampling bias.

Status and trend assessment

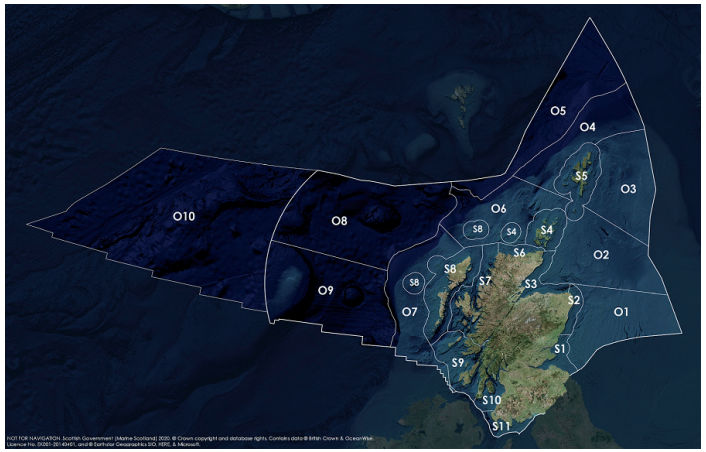
Region assessed	Status with confidence	Trend with confidence
Atlantic North West Approaches		
Irish Sea		
Minches and Western Scotland		
Northern North Sea		
Scottish Continental Shelf		

Status and trend assessment legend

Status assessment (for Clean and safe, Healthy and biologically diverse assessments)		Trend assessment (for Clean and safe, Healthy and biologically diverse and Productive assessments)	
	Many concerns		No / little change
	Some concerns		Increasing
	Few or no concerns		Decreasing
	Few or no concerns, but some local concerns		No trend discernible
	Few or no concerns, but many local concerns		All trends
	Some concerns, but many local concerns	**Confidence assessment**	
	Lack of evidence / robust assessment criteria	**Symbol**	**Confidence rating**
	Lack of regional evidence / robust assessment criteria, but no or few concerns for some local areas		Low
	Lack of regional evidence / robust assessment criteria, but some concerns for some local areas		Medium
	Lack of regional evidence / robust assessment criteria, but many concerns for some local areas		High

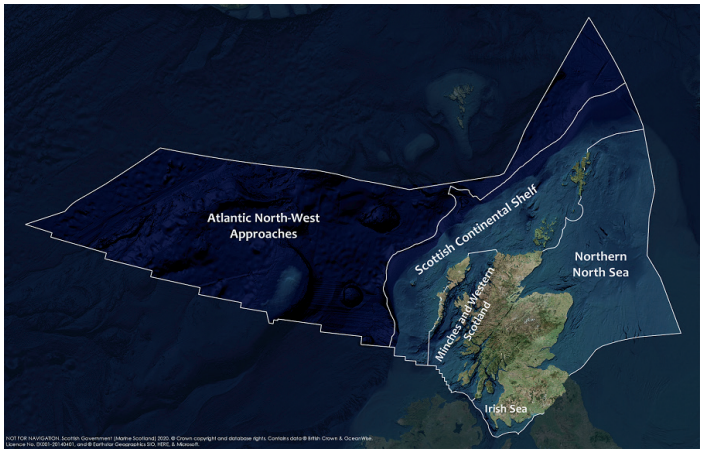
Overal confidence

Assessment regions

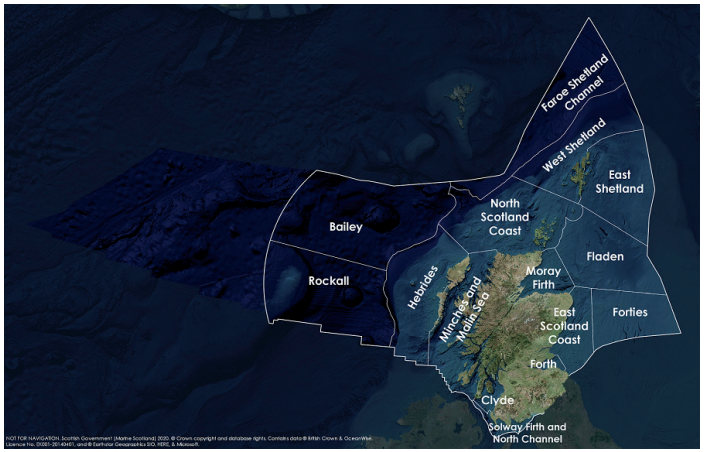


The Scottish Marine Regions (SMRs; S1 – S11) and the Scottish Offshore Marine Regions (OMRs, O1 – O10)

Key: S1, Forth and Tay; S2, North East; S3, Moray Firth; S4 Orkney Islands, S5, Shetland Isles; S6, North Coast; S7, West Highlands; S8, Outer Hebrides; S9, Argyll; S10, Clyde; S11, Solway; O1, Long Forties, O2, Fladen and Moray Firth Offshore; O3, East Shetland Shelf; O4, North and West Shetland Shelf; O5, Faroe-Shetland Channel; O6, North Scotland Shelf; O7, Hebrides Shelf; O8, Bailey; O9, Rockall; O10, Hatton.



Biogeographic, Charting Progress 2 (CP2) Regions. These have been used as the assessment areas for hazardous substances.



Scottish Sea Areas as used in Scotland's Marine Atlas 2011. These are sub divisions of the biogeographic, or Charting Progress 2 (CP2), Regions.

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NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

JNCC
Joint Nature Conservation Committee

SEPA
Scottish Environment Protection Agency

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