

Deep Sea Litter and Microplastics

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Introduction

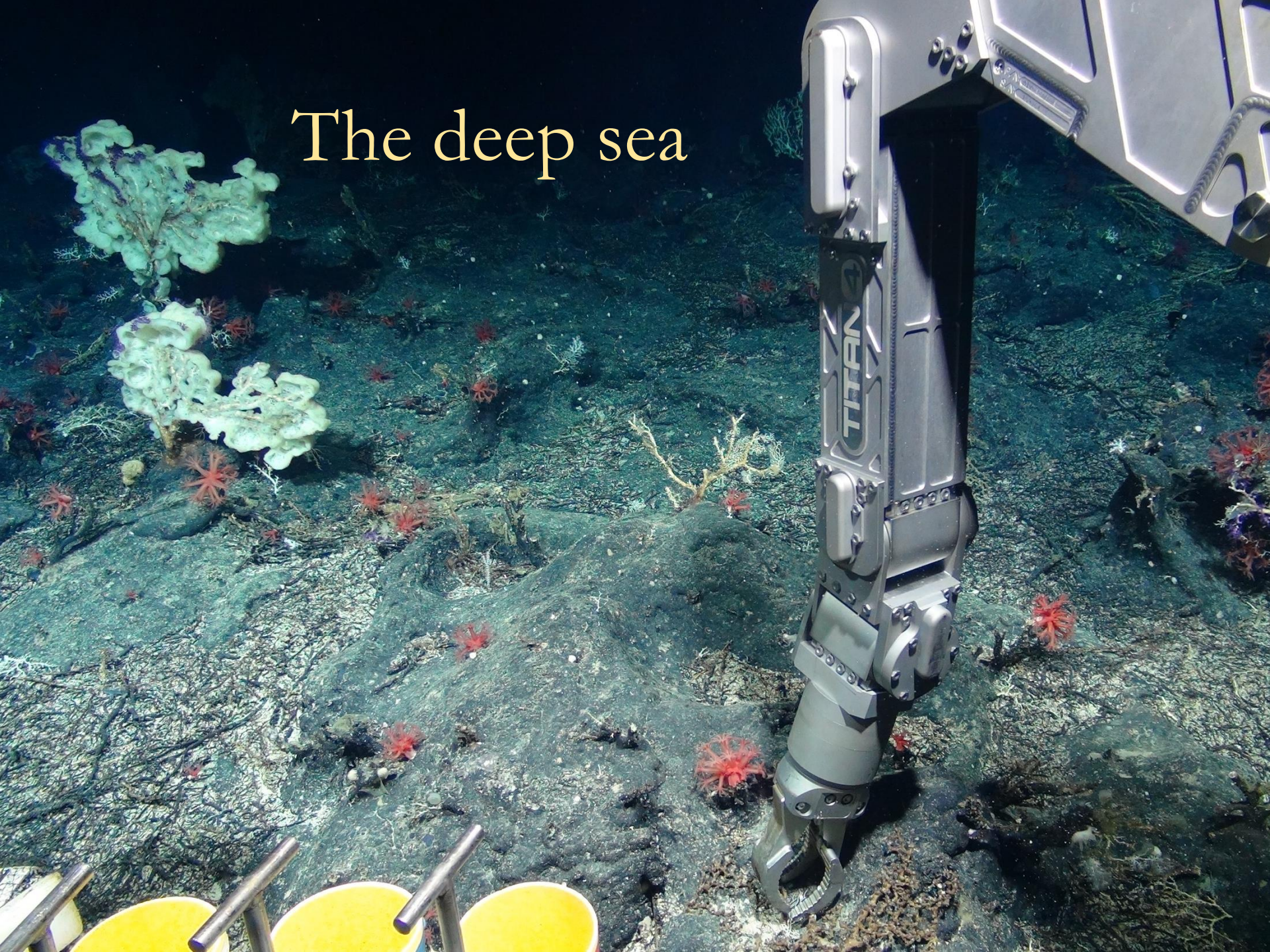


Taxa



Project Seahorse

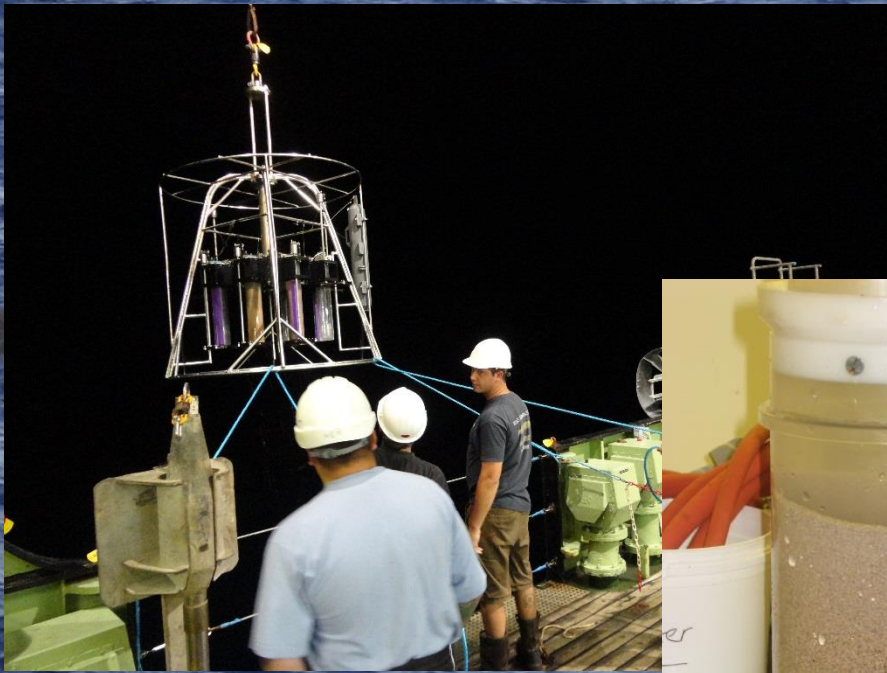
The deep sea



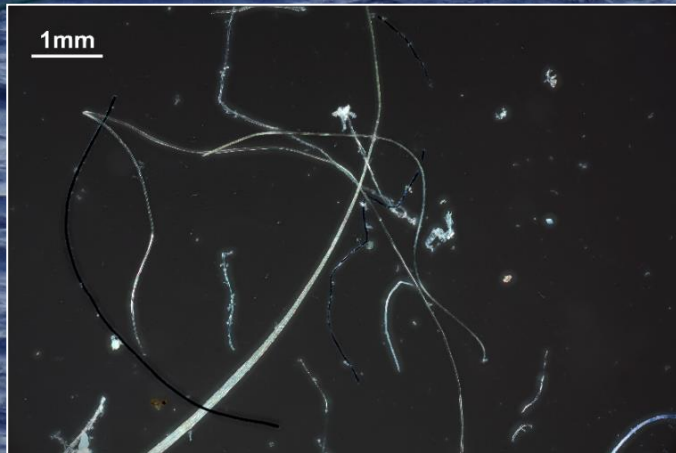
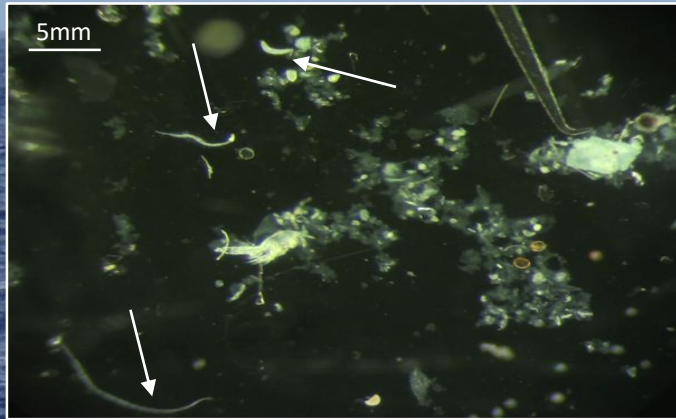
Life at sea



Sampling gear



A personal story



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Research



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The deep sea is a major sink for microplastic debris

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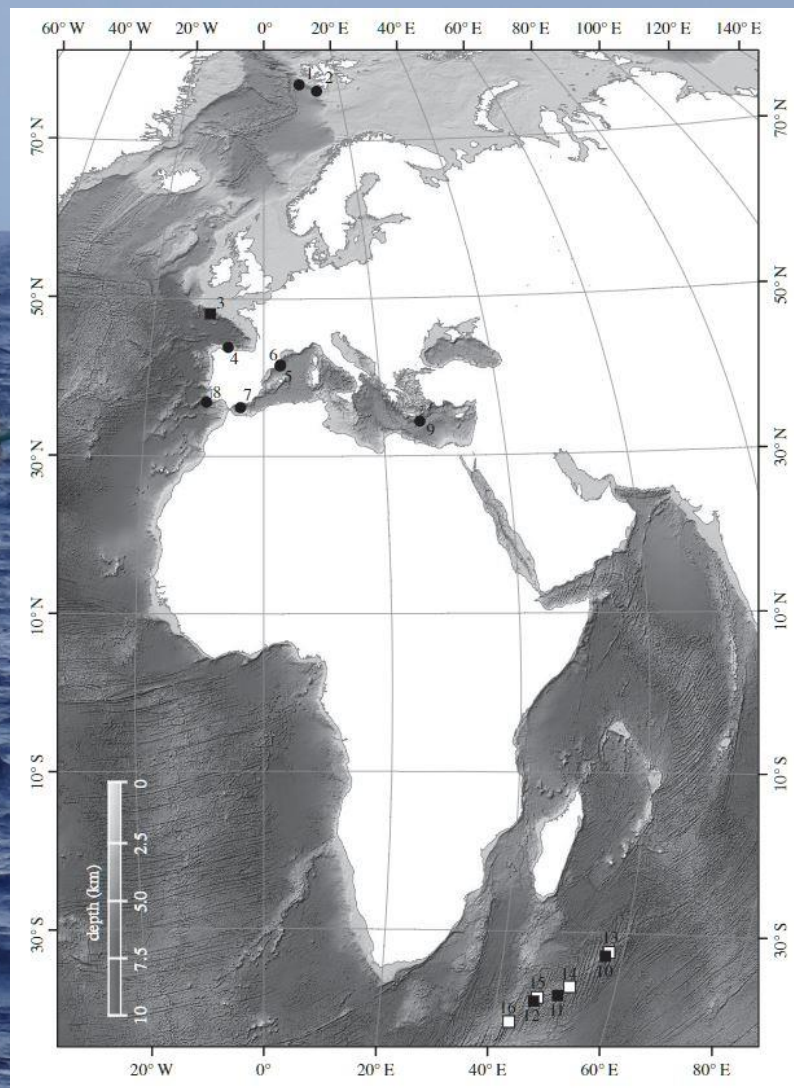
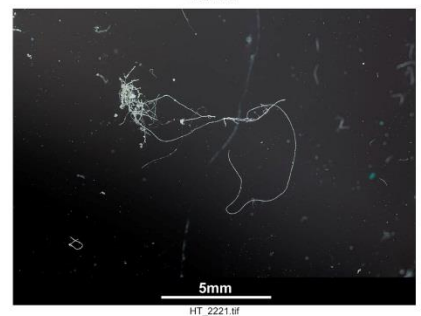
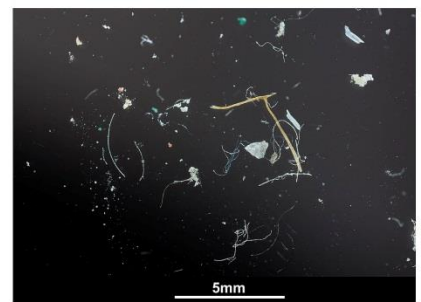
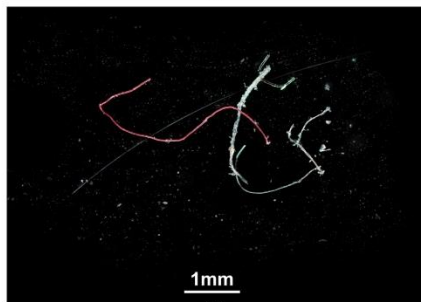
1. Summary

Marine debris, mostly consisting of plastic, is a global problem, negatively impacting wildlife, tourism and shipping. However, despite the durability of plastic, and the exponential increase in its production, monitoring data show limited evidence of concomitant increasing concentrations in marine habitats. There appears to be a considerable proportion of the manufactured plastic that is unaccounted for in surveys tracking the fate of environmental plastics. Even the discovery of widespread accumulation of microscopic fragments (microplastics) in oceanic gyres and shallow water sediments is unable to explain the missing fraction. Here, we show that deep-sea sediments are a likely sink for microplastics. Microplastic, in the form of fibres, was up to four orders of magnitude more abundant (per unit volume) in deep-sea sediments from the Atlantic Ocean, Mediterranean Sea and Indian Ocean than in contaminated sea-surface waters. Our results show evidence for a large and hitherto unknown repository of microplastics. The dominance of microfibrils points to a previously underreported and unsampled plastic fraction. Given the vastness of the deep sea and the prevalence of microplastics at all sites we investigated, the deep-sea floor appears to provide an answer to the question—*where is all the plastic?*

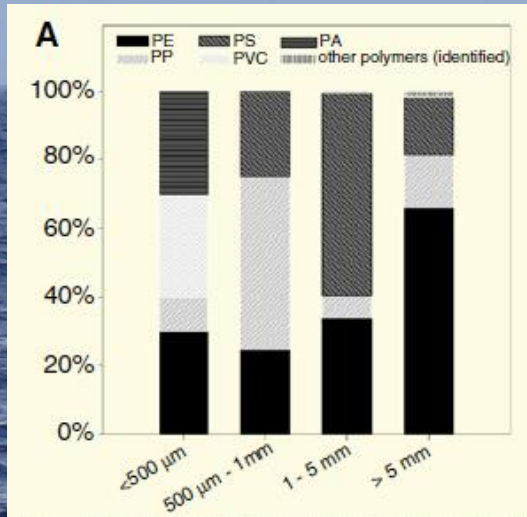
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Microplastics

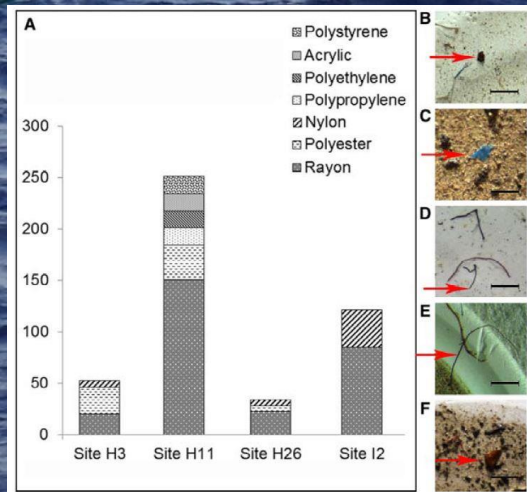
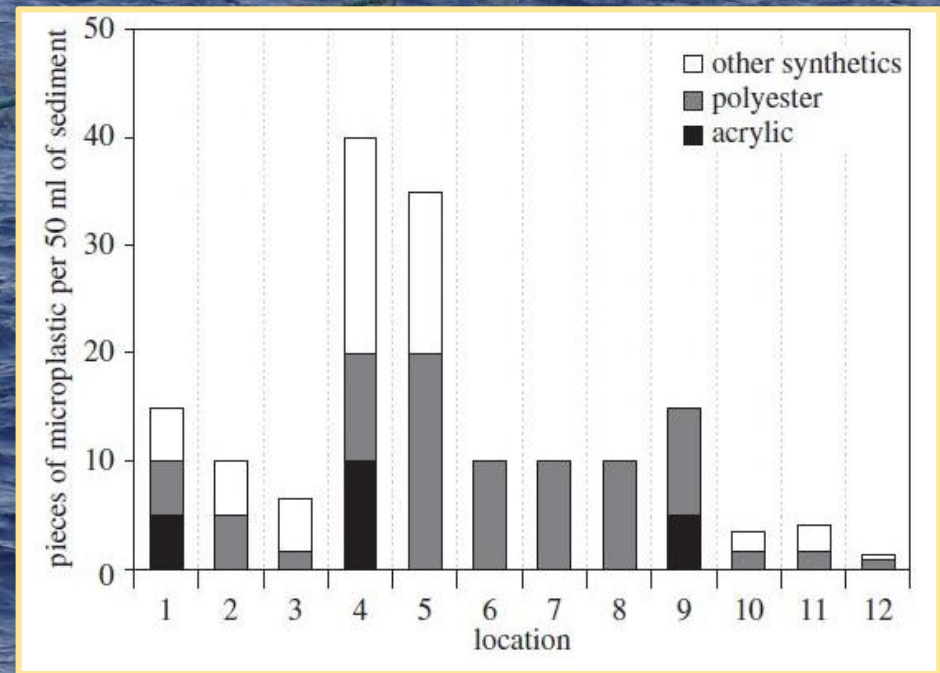




Microplastics composition



Imhof et al, 2013

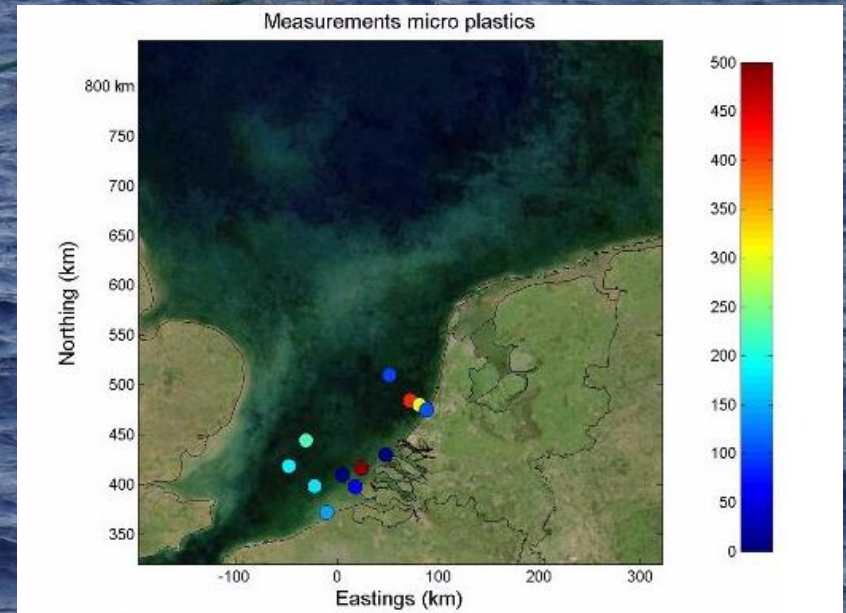


Obbard et al, 2014

Other Studies

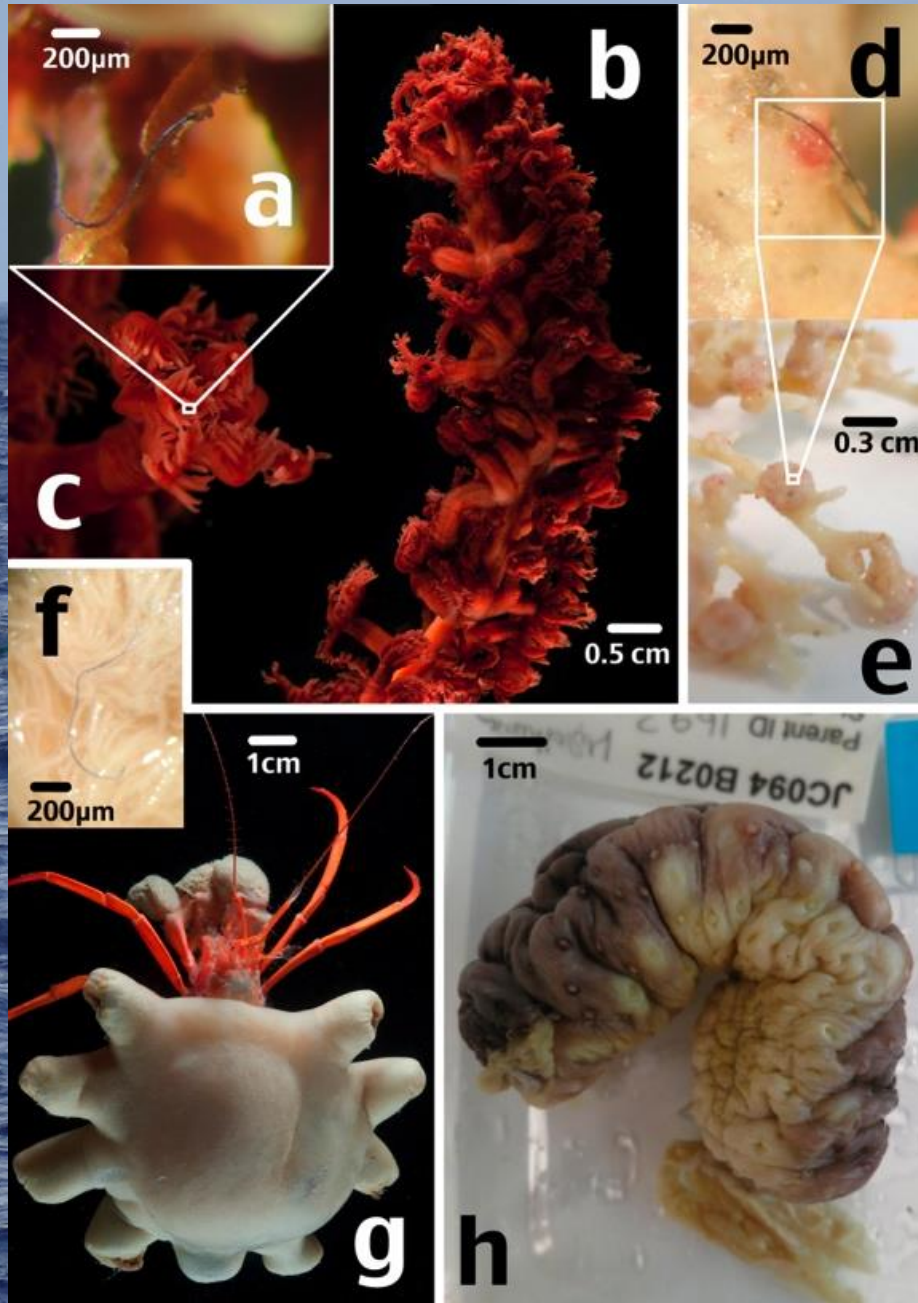


Fischer et al, 2015



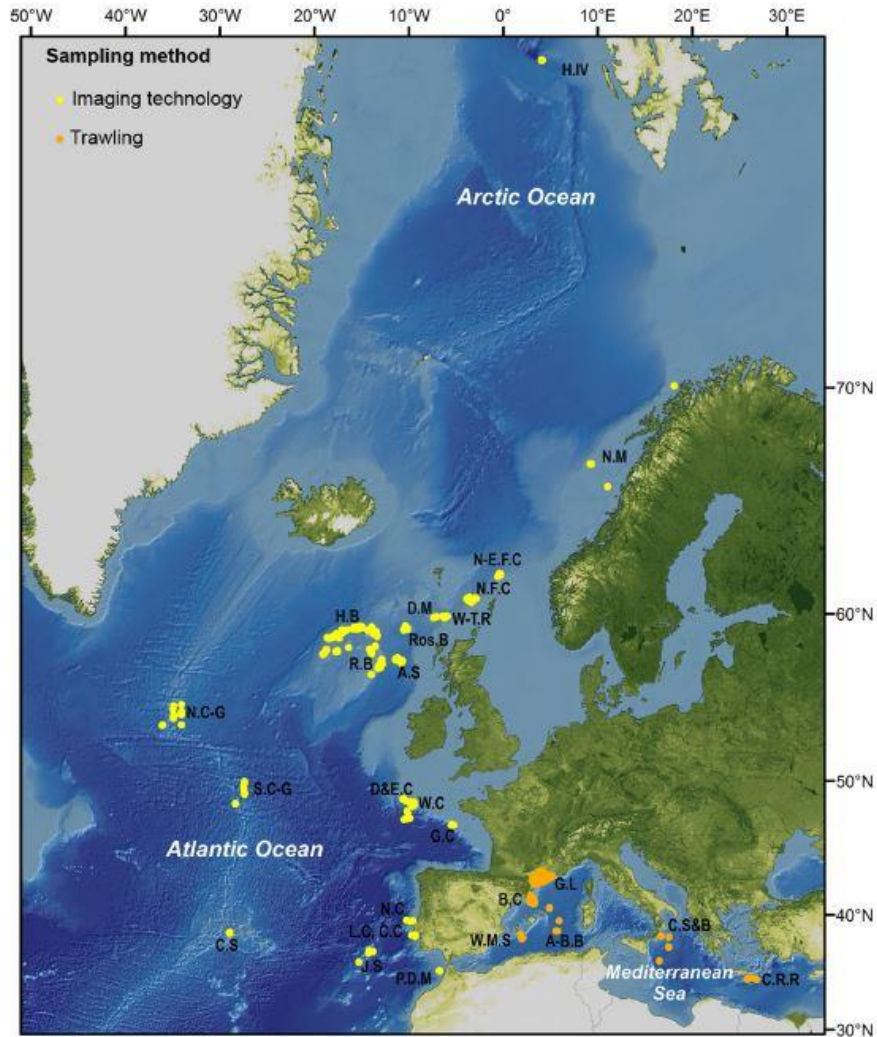
Maes et al, 2017

Ingestion

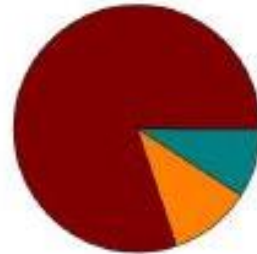


Deep Sea Debris

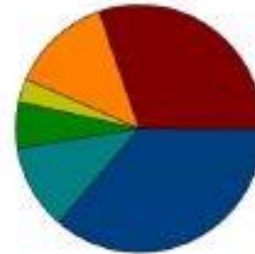




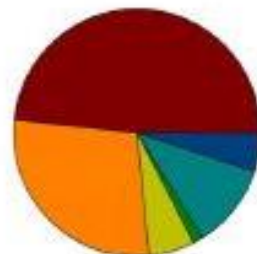
Continental shelves



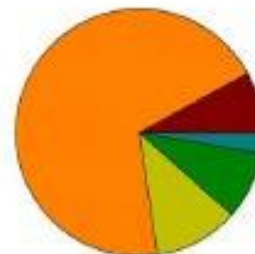
Continental slopes



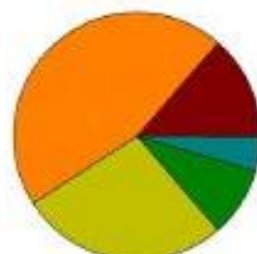
Submarine canyons



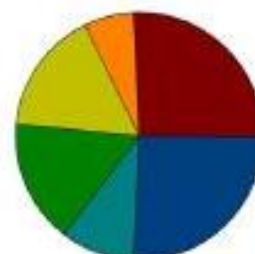
Seamounts, banks & mounds



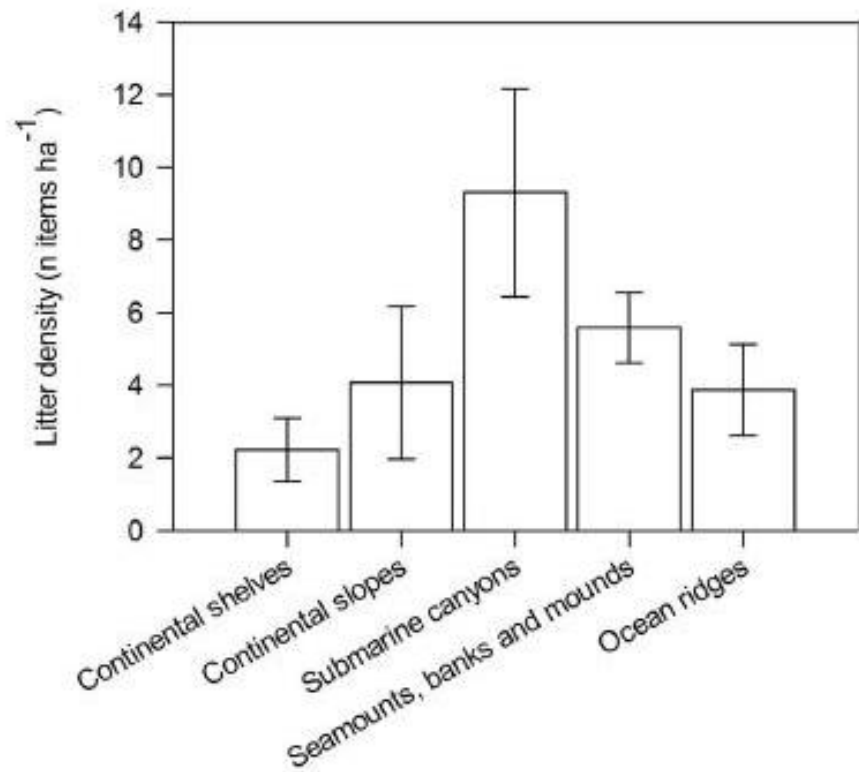
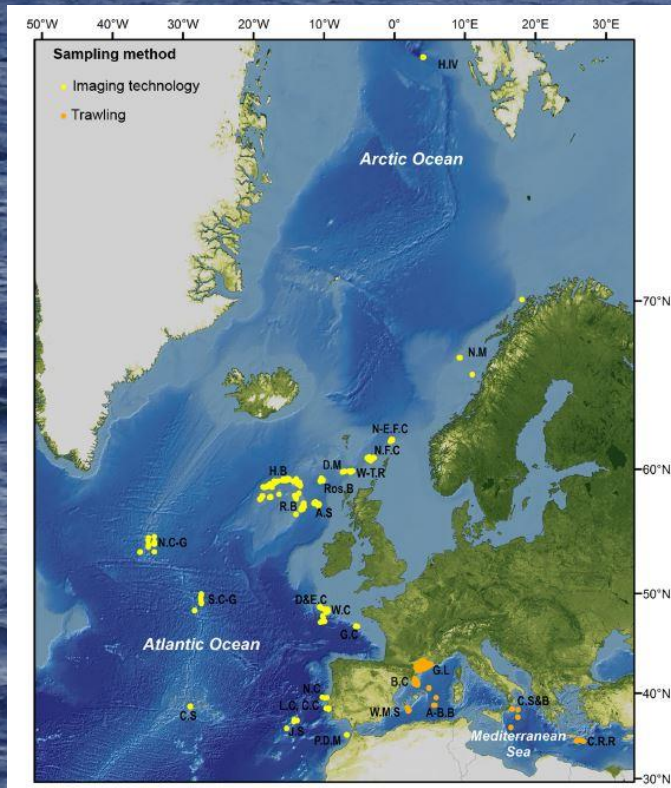
Ocean ridges



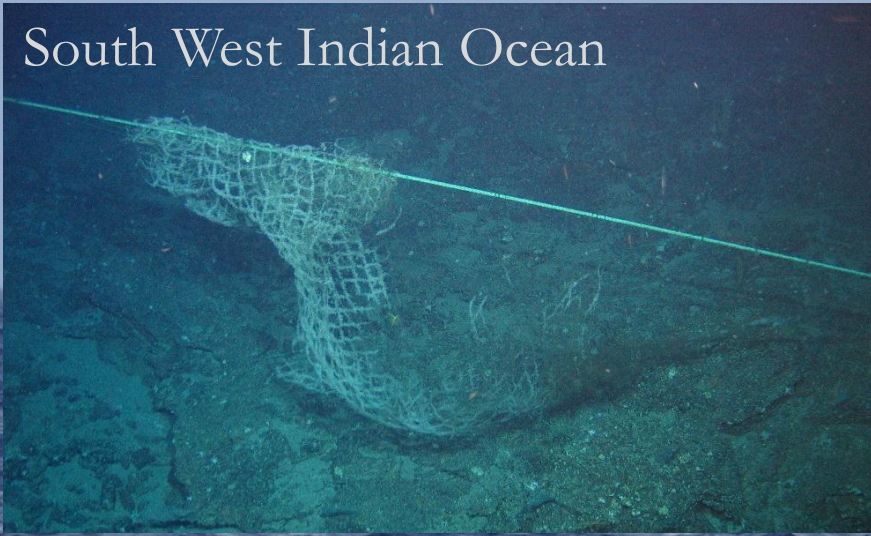
Deep basins



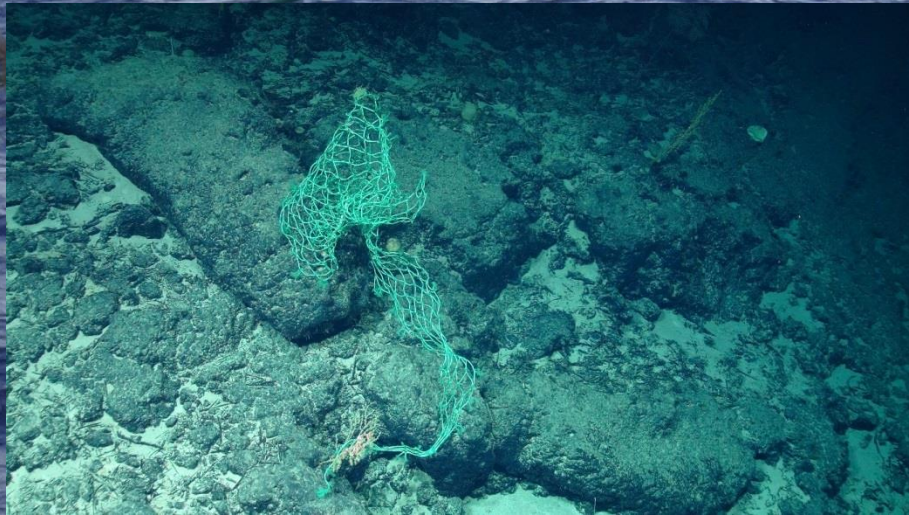
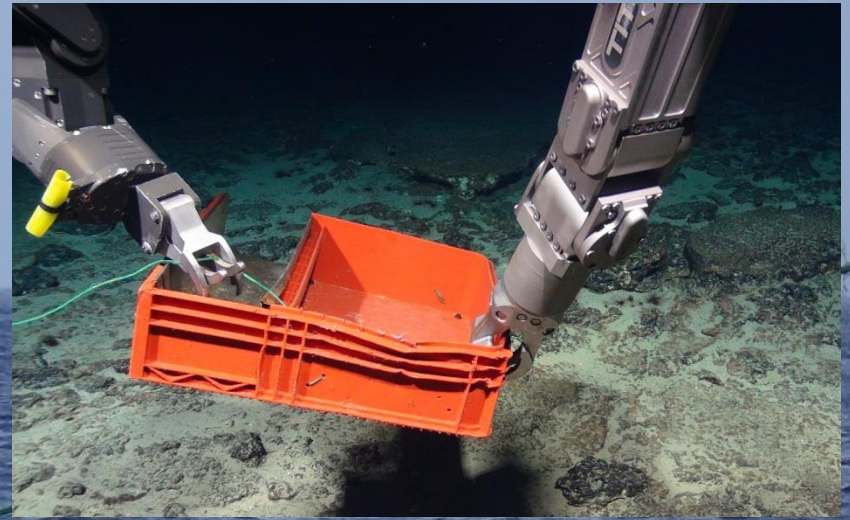
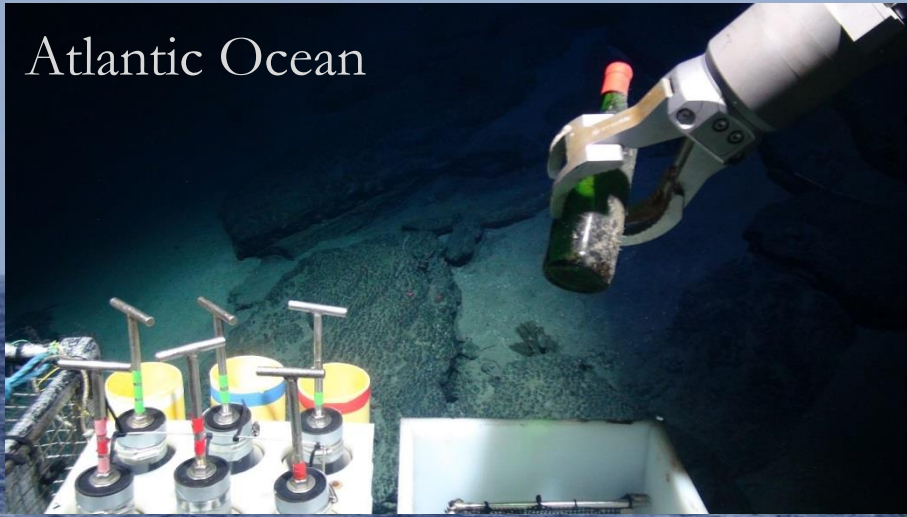
Deep Sea Debris



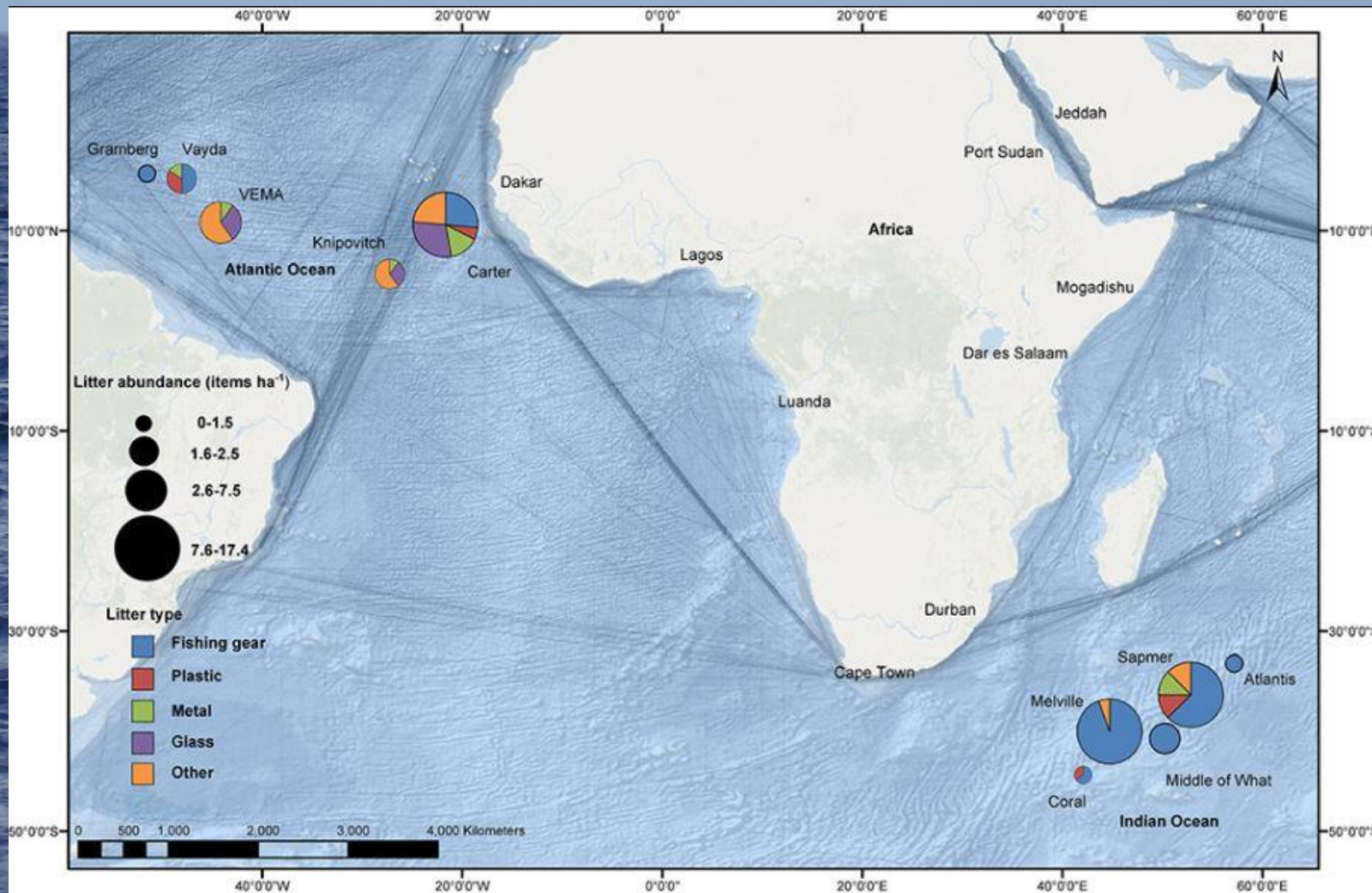
South West Indian Ocean



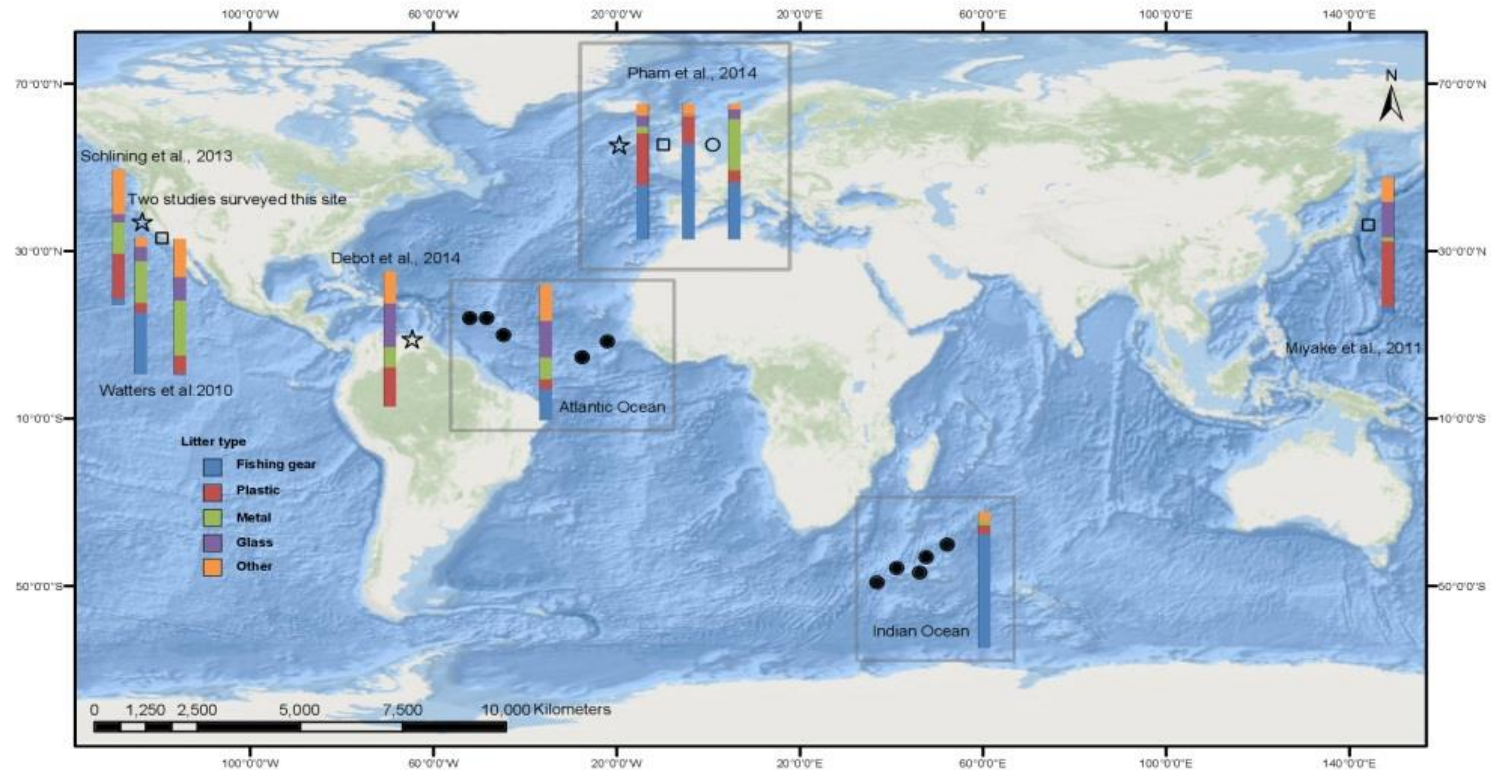
Atlantic Ocean

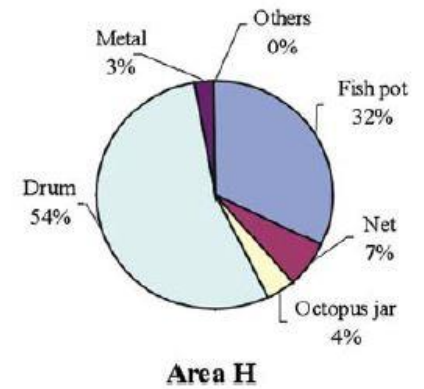
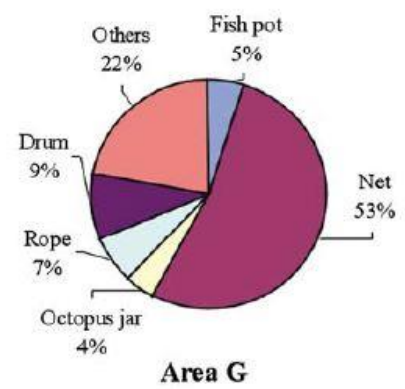
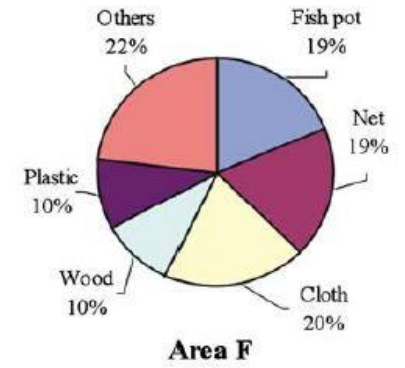
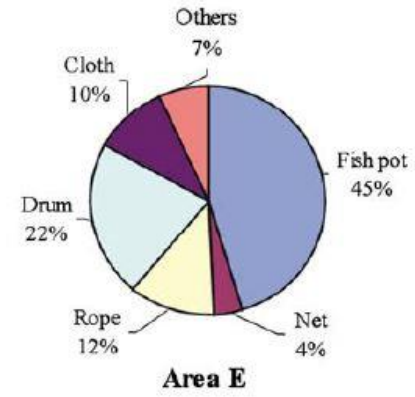
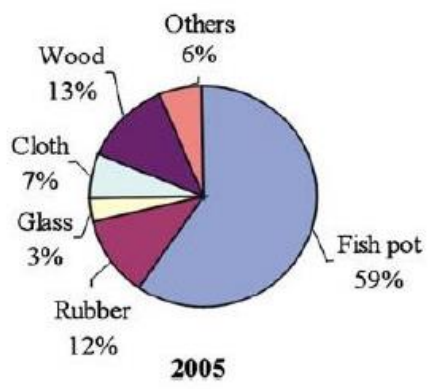
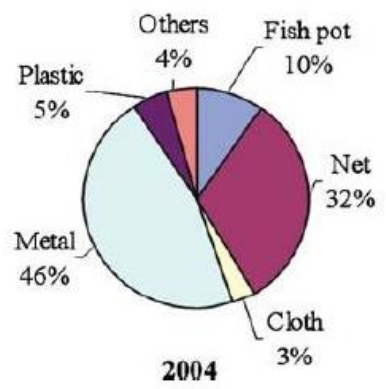
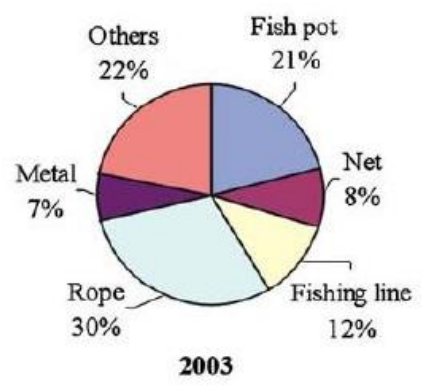
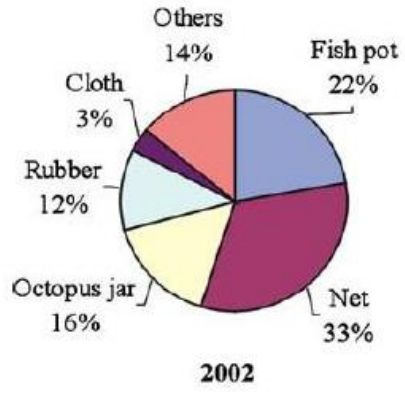


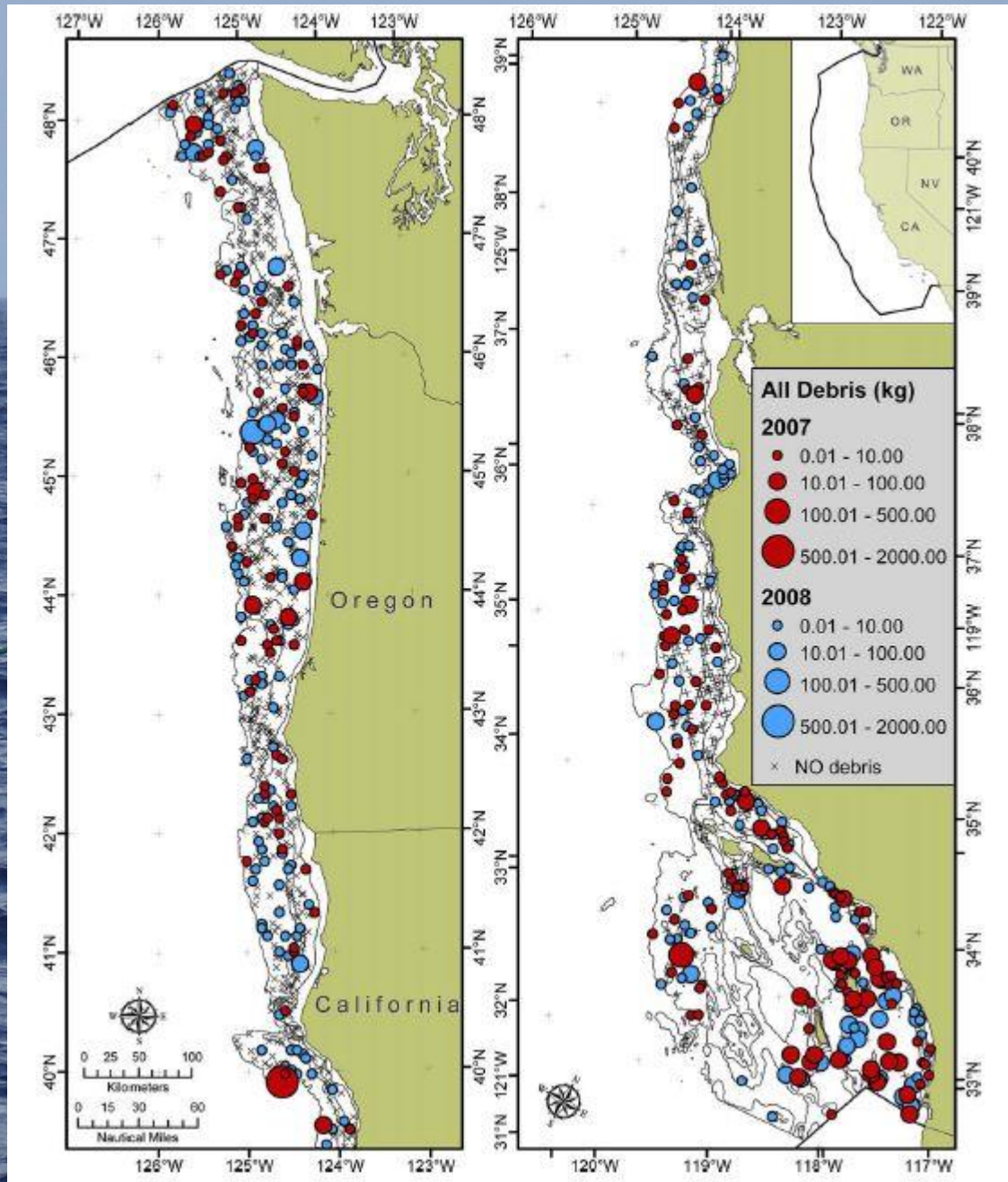
Deep sea litter

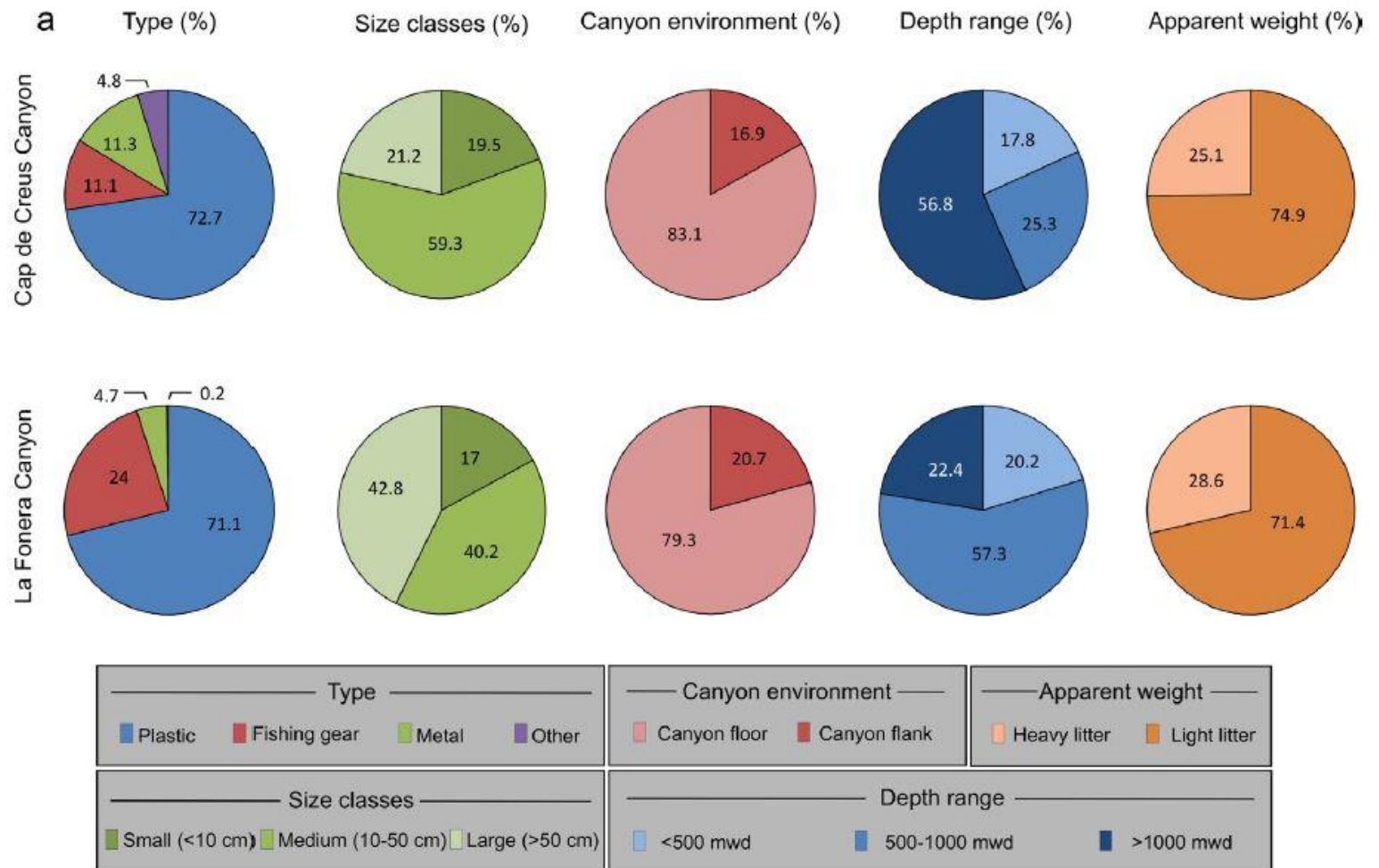


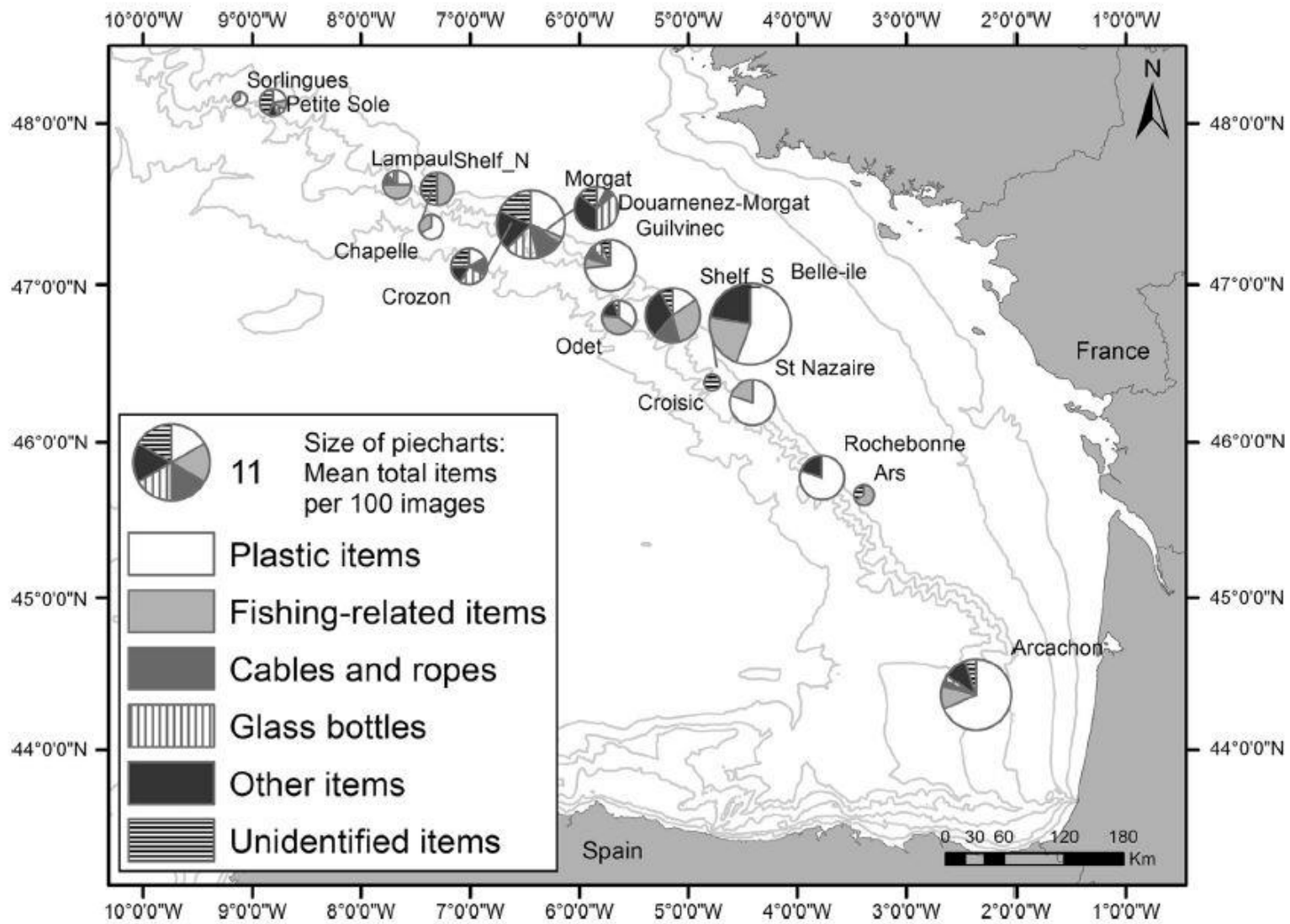
Deep sea litter











Future Research Suggestions

- Harmonise Methodology
- Collaborations
- On-line databases- Litterbase Bergmann et al.
- Deep sea hot spots?
- Estimations of abundance? Missing link?
- Impacts?

What can be done



Department for Environment Food & Rural Affairs

5p
Plastic bag charge

Large shops in England must charge 5p for single use plastic carrier bags from 5th October 2015

#reusebags
To find out more: gov.uk/carrierbags



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Plastics

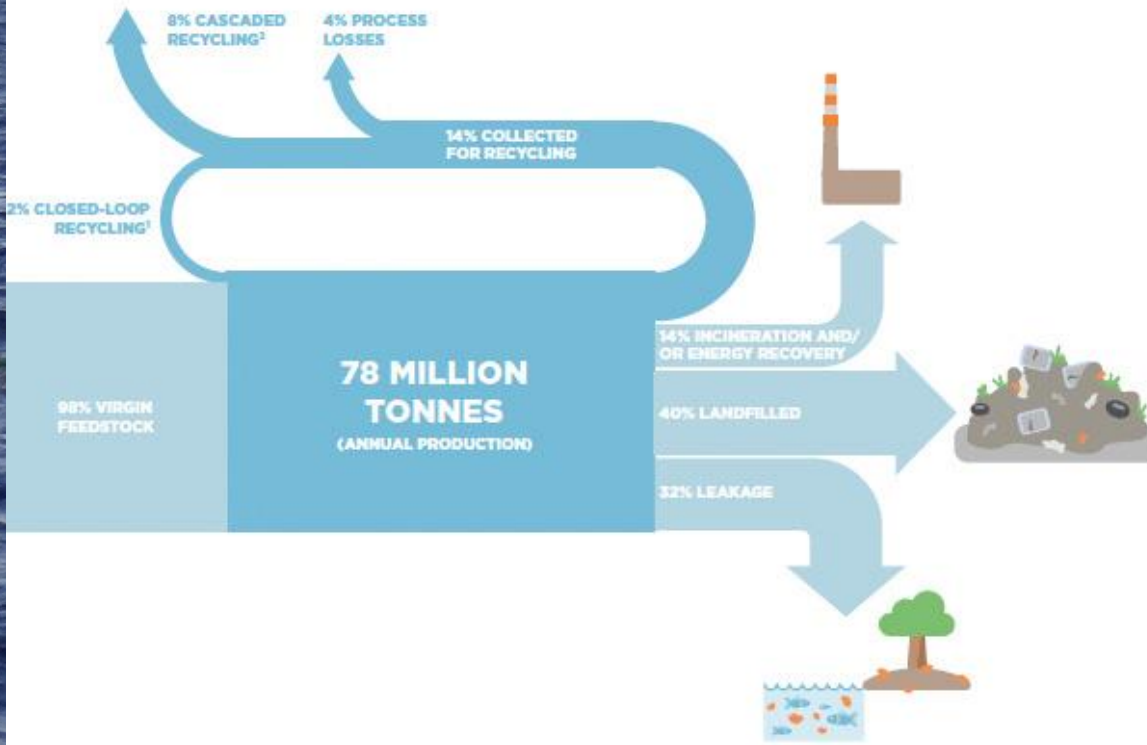
UK government to ban microbeads from cosmetics by end of 2017

What can be done



What can be done

GLOBAL FLOWS OF PLASTIC PACKAGING MATERIALS IN 2013



Questions?

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University of Oxford
Nekton Foundation

