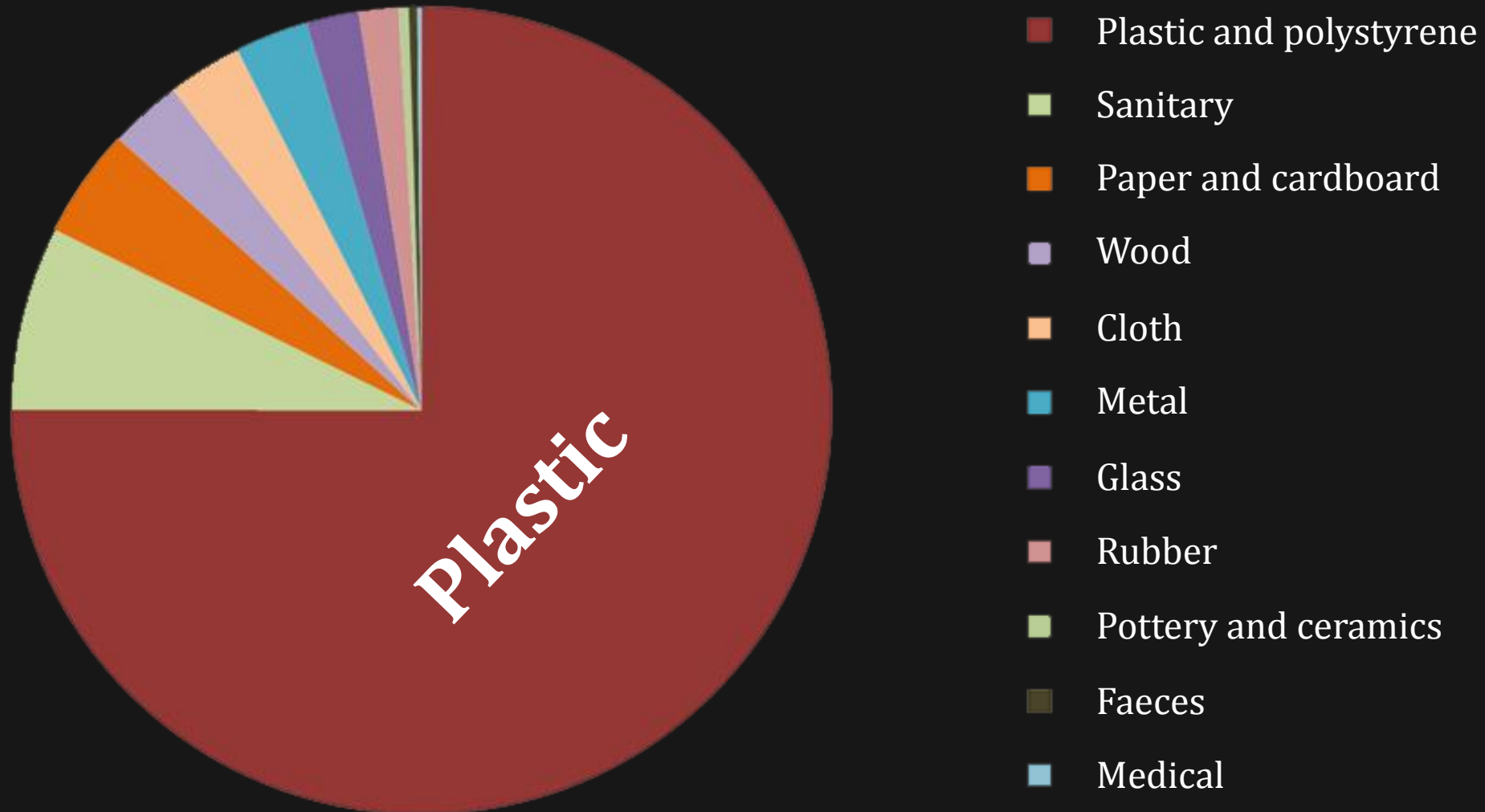


The Ocean Imperative

Prof. Richard Thompson, OBE
University of Plymouth, UK



Most marine litter is plastic



Shoreline



Deep sea



Types of debris



Large and rare



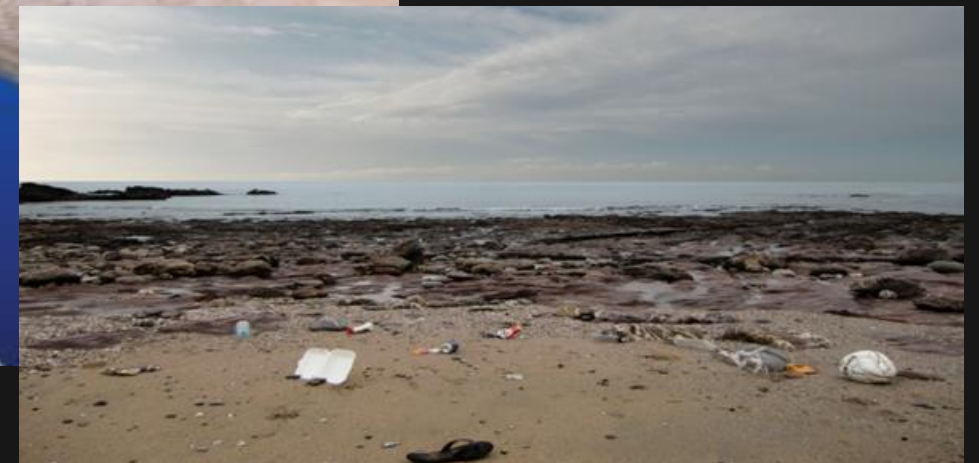
Small and ubiquitous

*Plastic debris is everywhere so what,
is it harmful ?*

Economic consequences



Consequences for Human health and wellbeing



Consequences for wildlife

Encounters with litter:

- > 300 papers
- ~ 700 Species
- 92% of encounters are with plastic
- 17 % threatened / near threatened IUCN status



Microplastics:

10% of published encounters by species

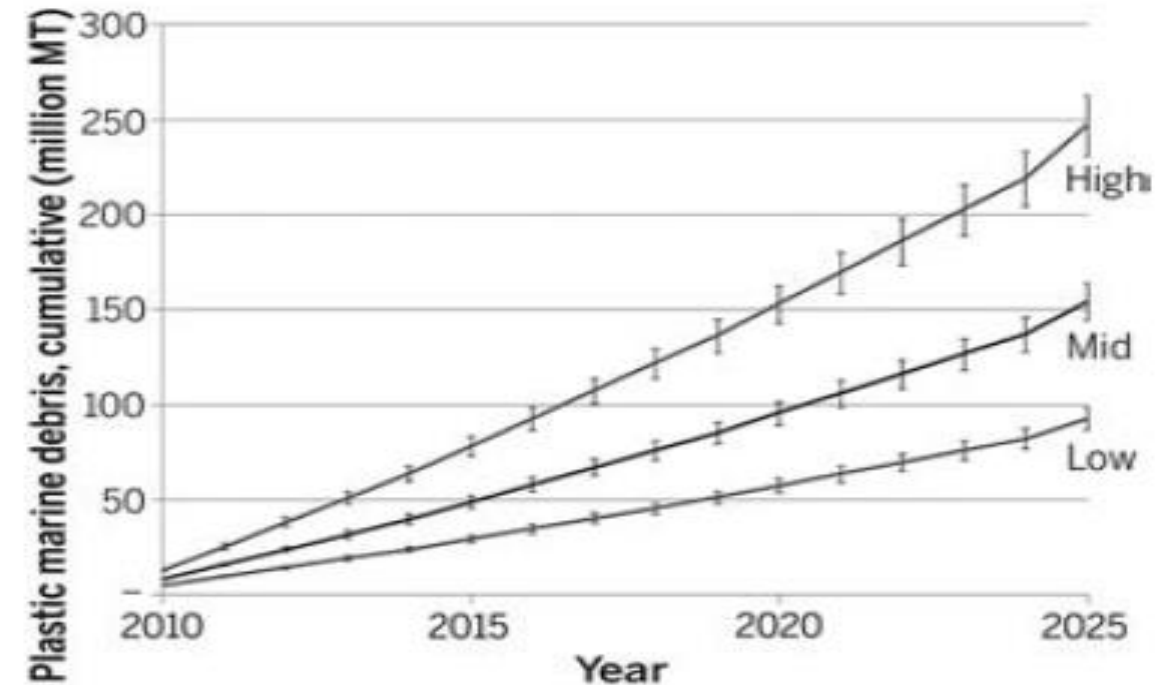
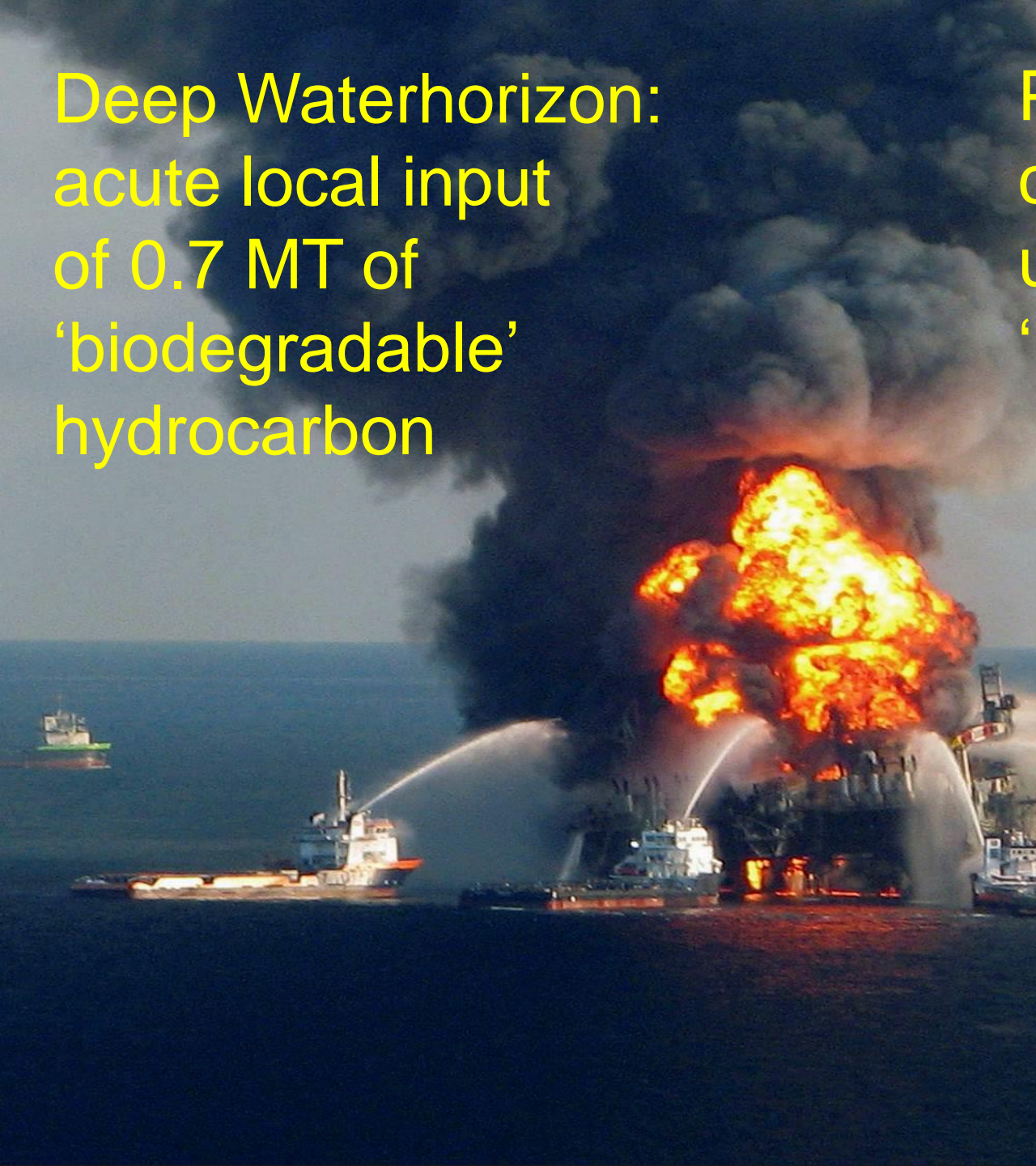


Deep Waterhorizon:
acute local input
of 0.7 MT of
'biodegradable'
hydrocarbon



Deep Waterhorizon:
acute local input
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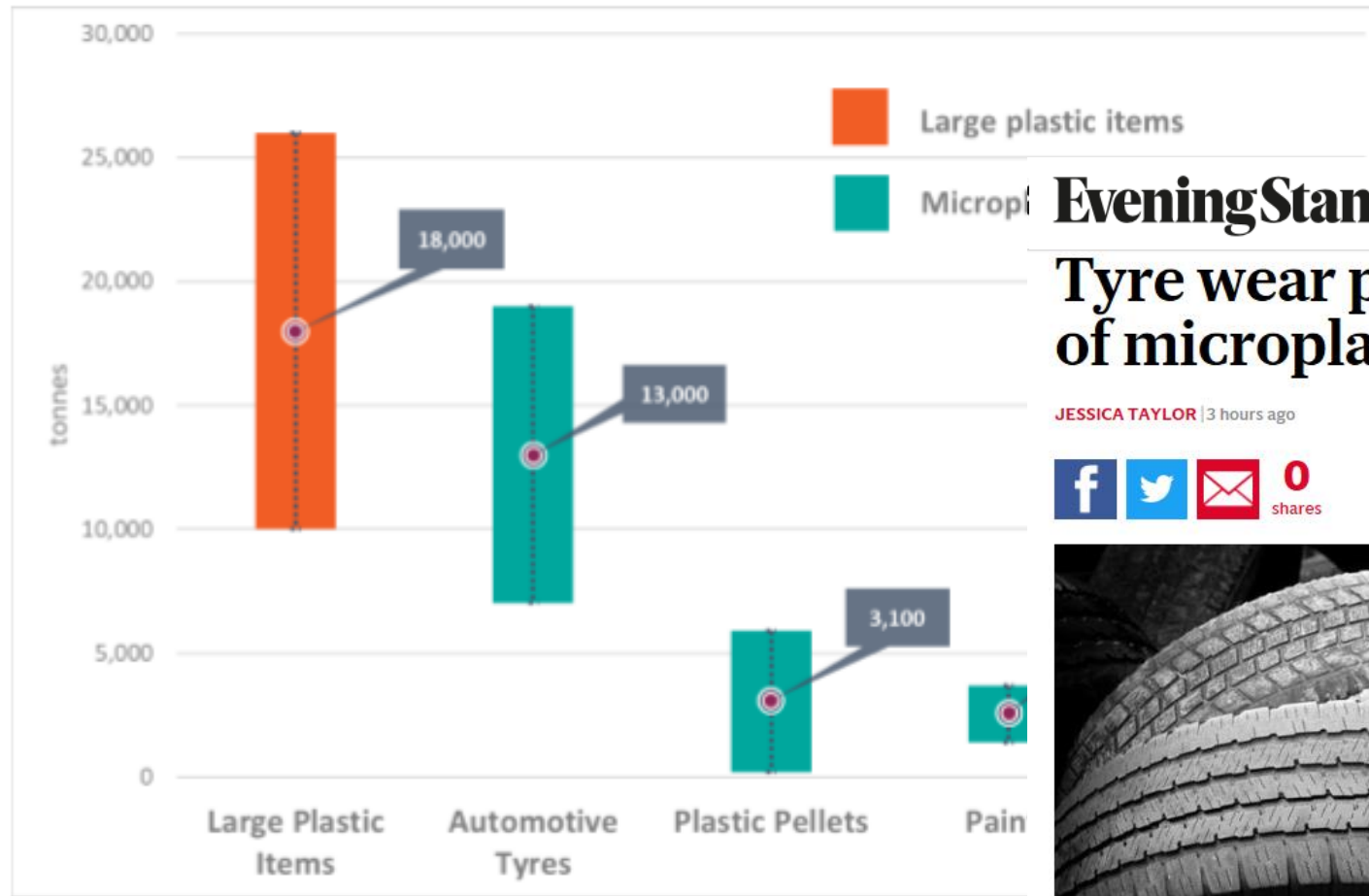
Plastic debris:
chronic diffuse input -
up to 17 MT per annum of
'non-biodegradable' hydrocarbon



*Is there enough evidence to take action,
or are there key knowledge gaps?*

What are the main sources of plastic and microplastic litter ?

Figure 1 – Estimates for Key Sources of Plastic Pollution to Surface Waters from the UK from land-based sources



EveningStandard. News Comment Football Insider GO London Lifestyle Showbiz Homes &

Tyre wear pumping almost 20,000 tonnes of microplastics into oceans each year

JESSICA TAYLOR | 3 hours ago

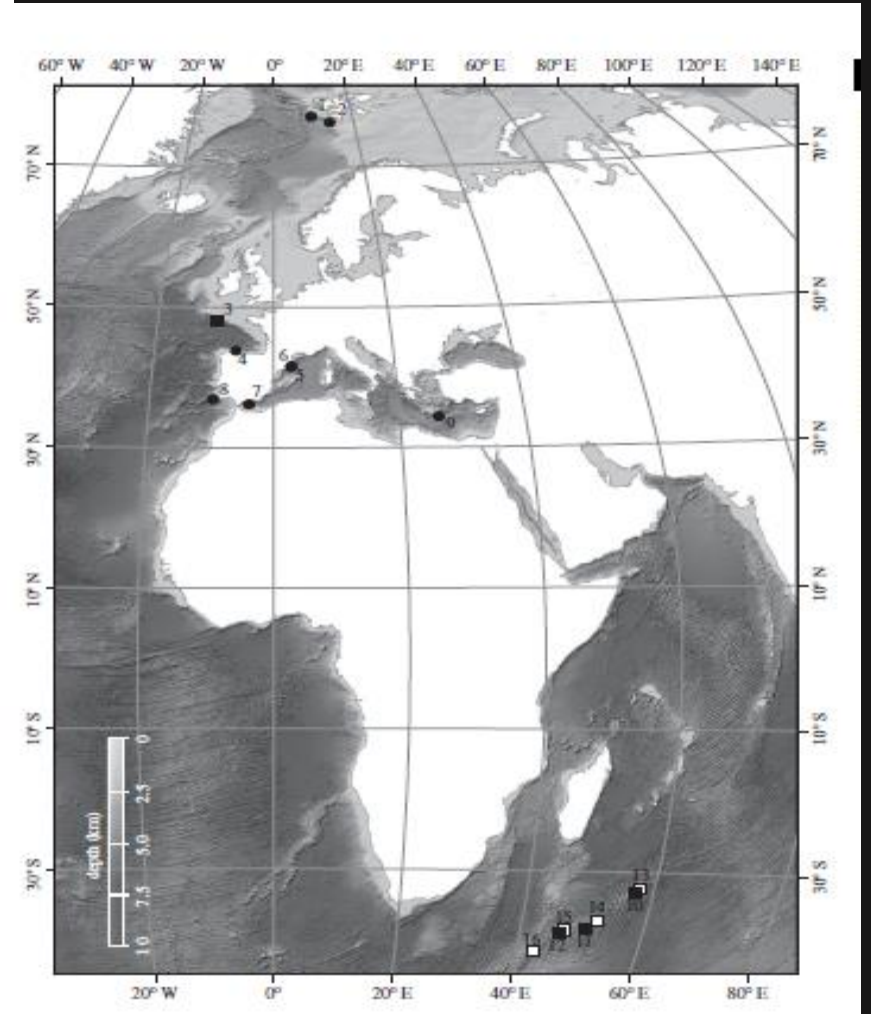
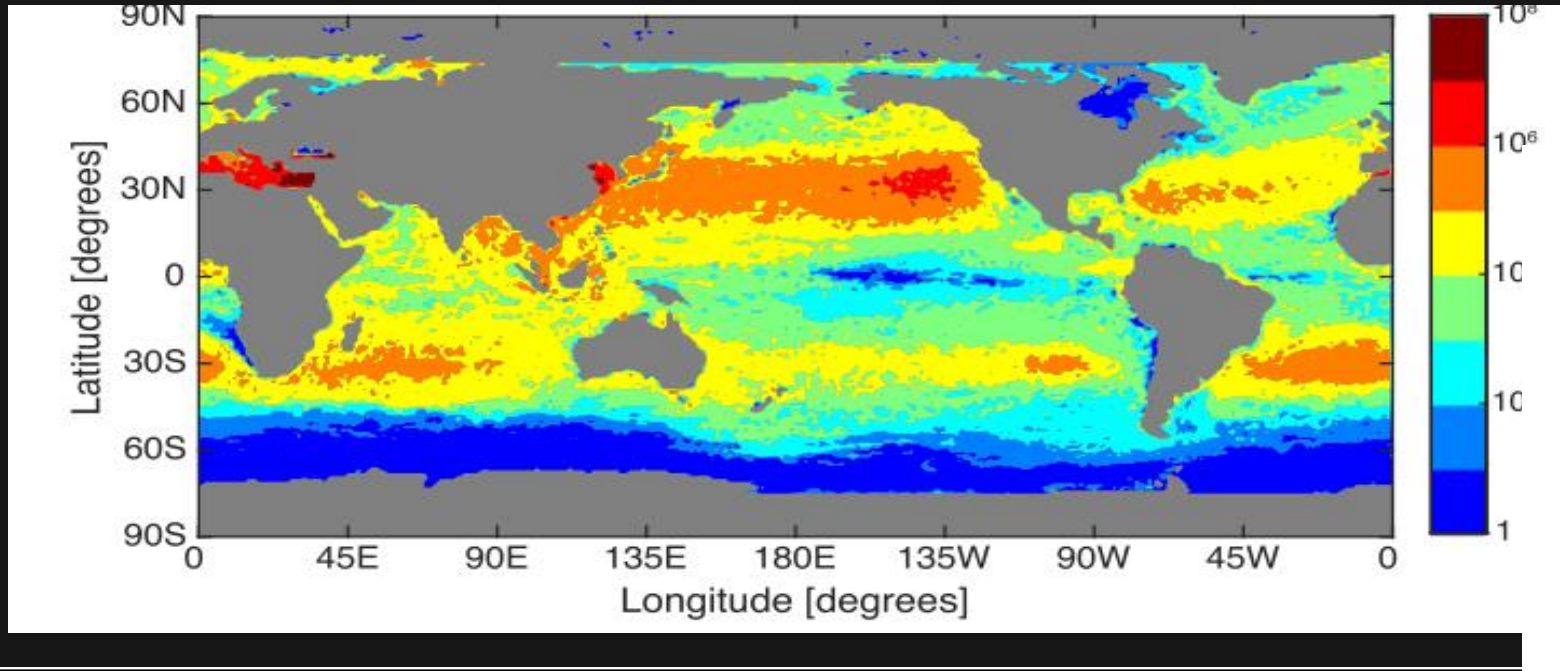
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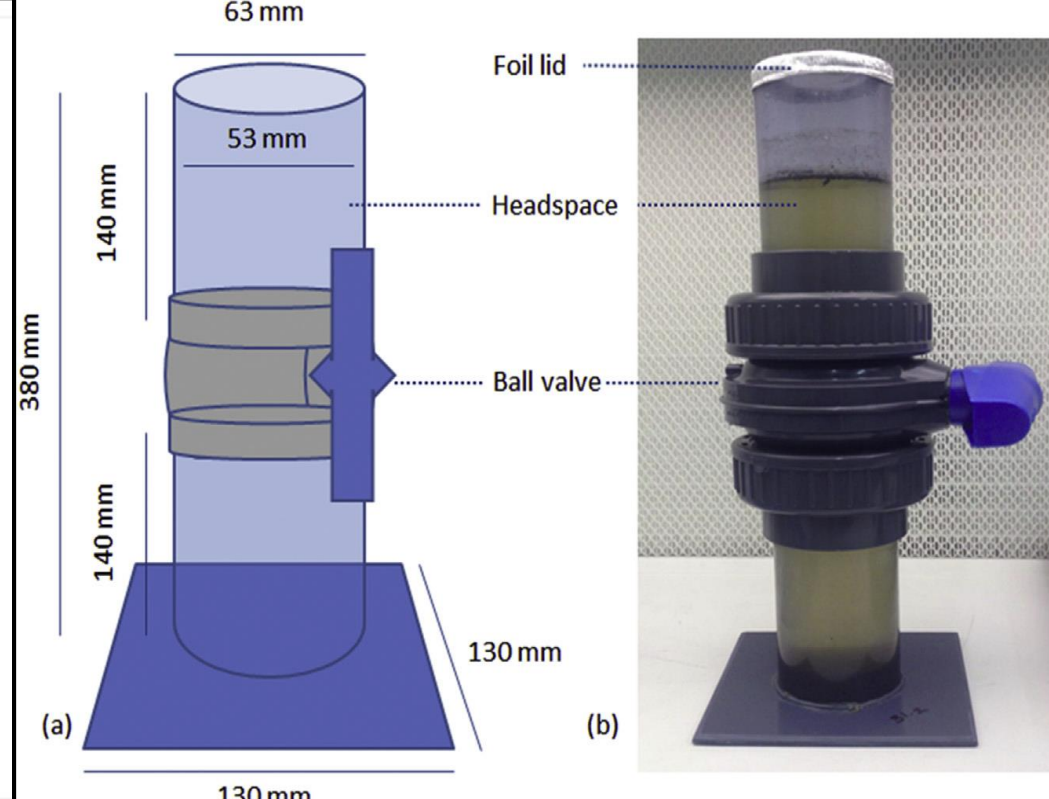


What are the main sinks of microplastics? (the missing plastic???)



Browne et al 2011, Woodall et al 2014
Van Sebille 2015, Lavender Law 2010

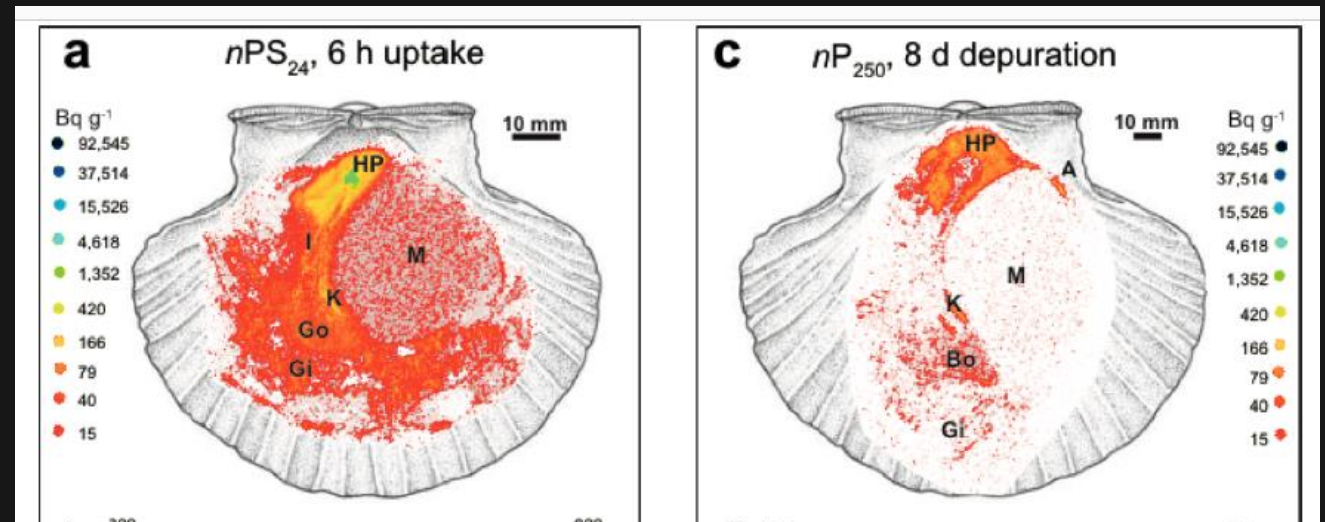
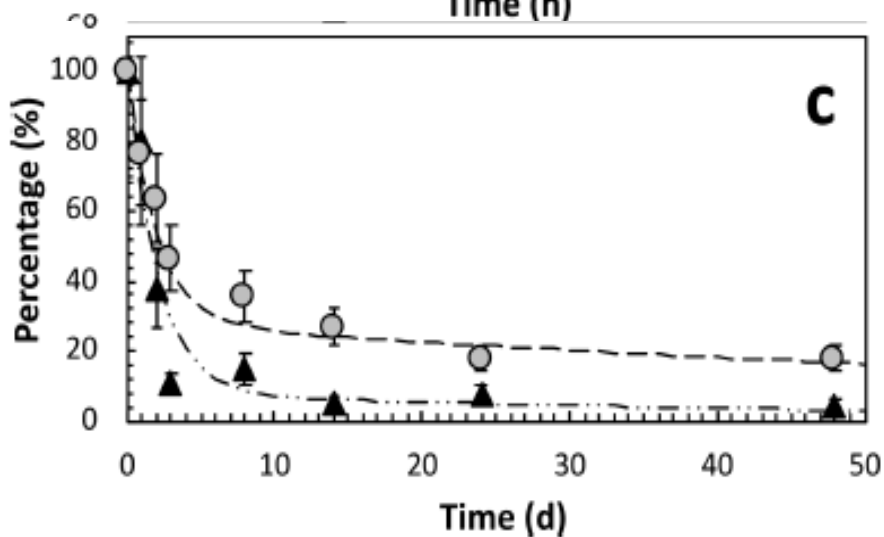
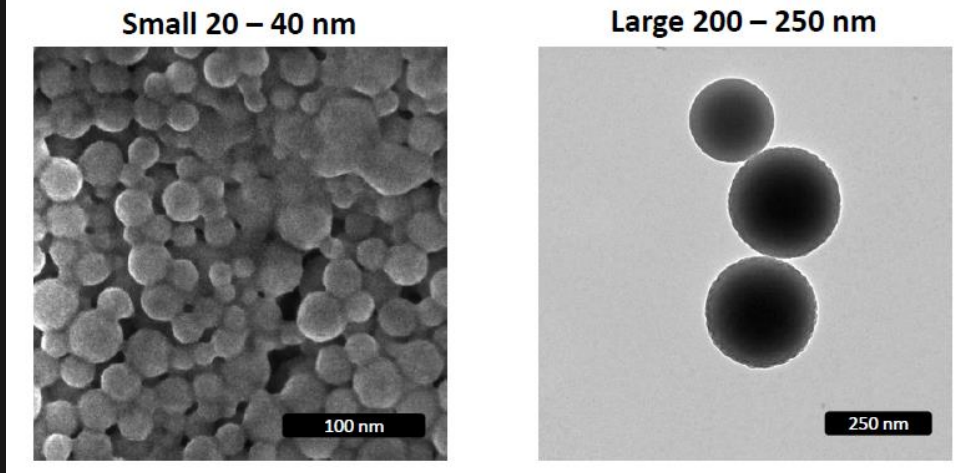
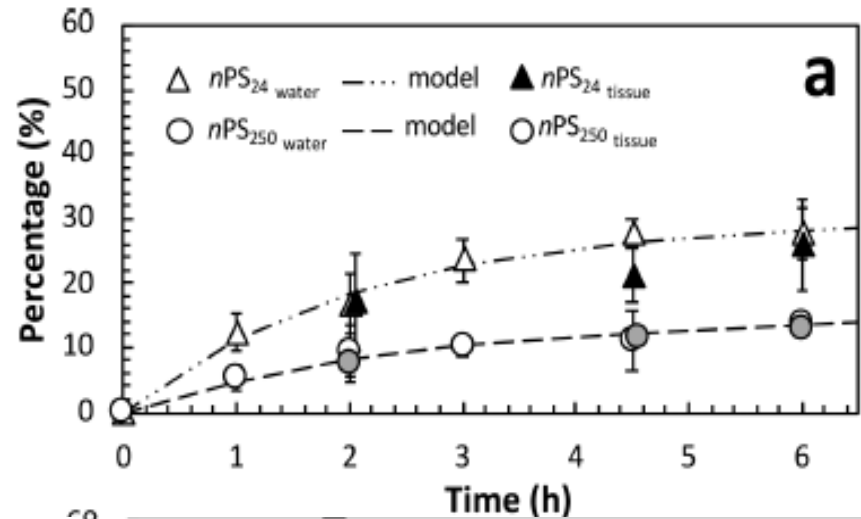
How best to sample, separate, identify monitor?



No universal method see:

MSFD TG10 Guidance on monitoring marine litter (2014) – Section 3.5 - Microlitter

Do nano plastics present different threats?



If there is enough evidence to take action,

What are the solutions?

Plastics as materials are not the cause of the problem



Lightweight



Versatile

Plastics as materials are not the cause of the problem



Durable



Inexpensive

Plastics as materials are not the cause of the problem



How to keep the benefits

without the problems?

Unlike other challenges the negative consequences are not directly coupled to societal benefit





Redirect the flow

Block the holes

Clean up





Redirect the flow



Block the holes

Clean up

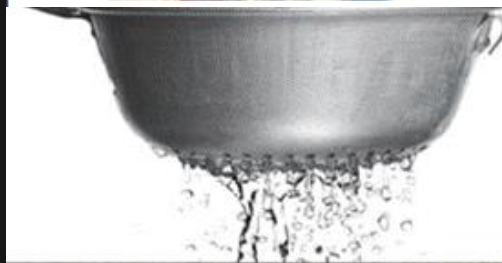




Redirect the flow



Block the holes



Clean up



60 years of design

60 years of behavioural training to throw away (linear)



1950s - Time Life magazine, throw away living

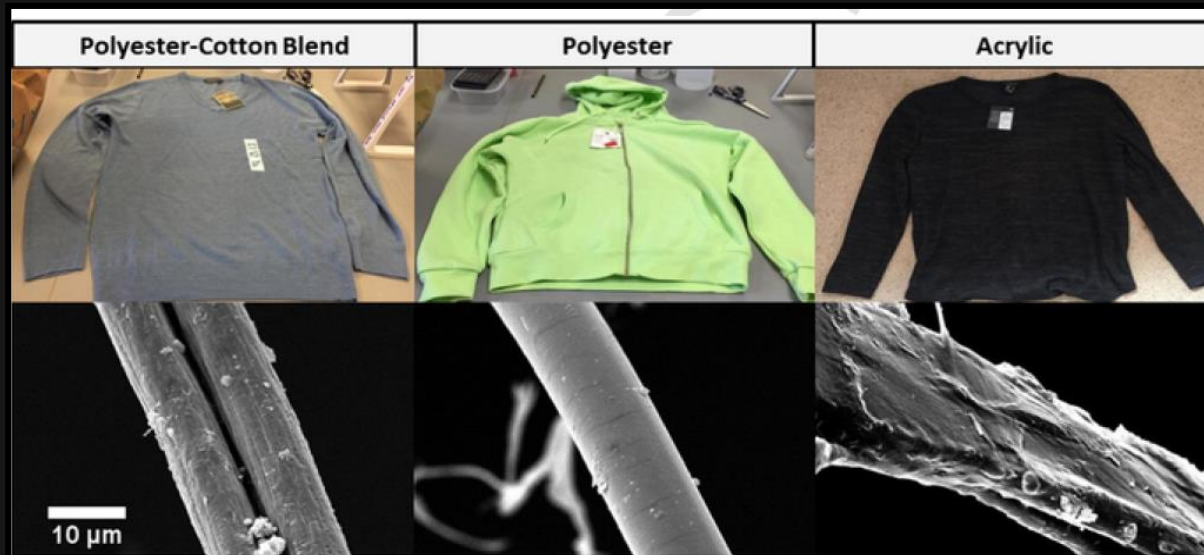


2010s - 50% of shoreline litter is single use items

Material Reduction



The Ocean Imperative Design products – for life in service and end of life



Translating theory in to actions

The ocean imperative:
current situation *'bad'*

Options



Actions



New norm
'better'

- Reduce
- Reuse
- Ban plastic
- Change the material
- Recycle
- Educate



appropriate will
reinforce / incentivise
change



inappropriate negative
consequences
dis-incentivise change




Unintended
consequences
'bad' or
even worse!



Plastic debris in the oceans

- Is a symptom of inefficient outdated business model
- Is not directly coupled to societal benefits
- Damages resources (economy, wildlife, services)
- Solutions exist – but there is no single solution
- Focus on design for life and end of life
- Synergistic benefits (resource efficiency / waste reduction)
- Harness current interest - focus on product design and waste management
- Essential to have reliable independent evidence to inform interventions

Richard Thompson - Thank you




International Marine Litter Research Unit
Furthering our understanding of litter on the environment and defining solutions

 Team

 Publications

 Impact

 Contact

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