Benthic marine litter collection between 1992 and 2008: Towards an assessment of marine litter that might cause harm to the marine environment

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Outline

- Background information on MSFD
- Cefas' work on inshore and offshore Litter collection
  - Methods
  - Results
  - Conclusion and forward look

Background

- Marine Strategy Framework Directive
  - To put in place measures to achieve Good Environmental Status in Europe's seas by 2020

'good environmental status' means the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive within their intrinsic conditions, and the use of the marine environment is at a level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations

- Overall 11 qualitative descriptors for determining good environmental status have been identified

MSFD GES descriptors;

(1) Biological diversity is maintained. species are in line with prevailing physiographic, geographic and climatic conditions.

(2) Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems.

(3) Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.

(4) All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity.

(5) Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters.

MSFD GES descriptors;

(6) Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.

(7) Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems.

(8) Concentrations of contaminants are at levels not giving rise to pollution effects.

(9) Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards.

(10) Properties and quantities of marine litter do not cause harm to the coastal and marine environment.

(11) Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.

Cefas' work on inshore and offshore Litter collection

- Marine litter has been collected as additional activities on Cefas surveys
- The International Bottom Trawl Survey (IBTS) has recorded observations of litter since 1992 from 75 fixed stations in the North Sea (Fig 1)
- The Clean Seas Environmental Monitoring Programme (CSEMP) collected marine litter since 2000 from up to 31 English and Welsh stations in intermediate and offshore waters (Fig 1)

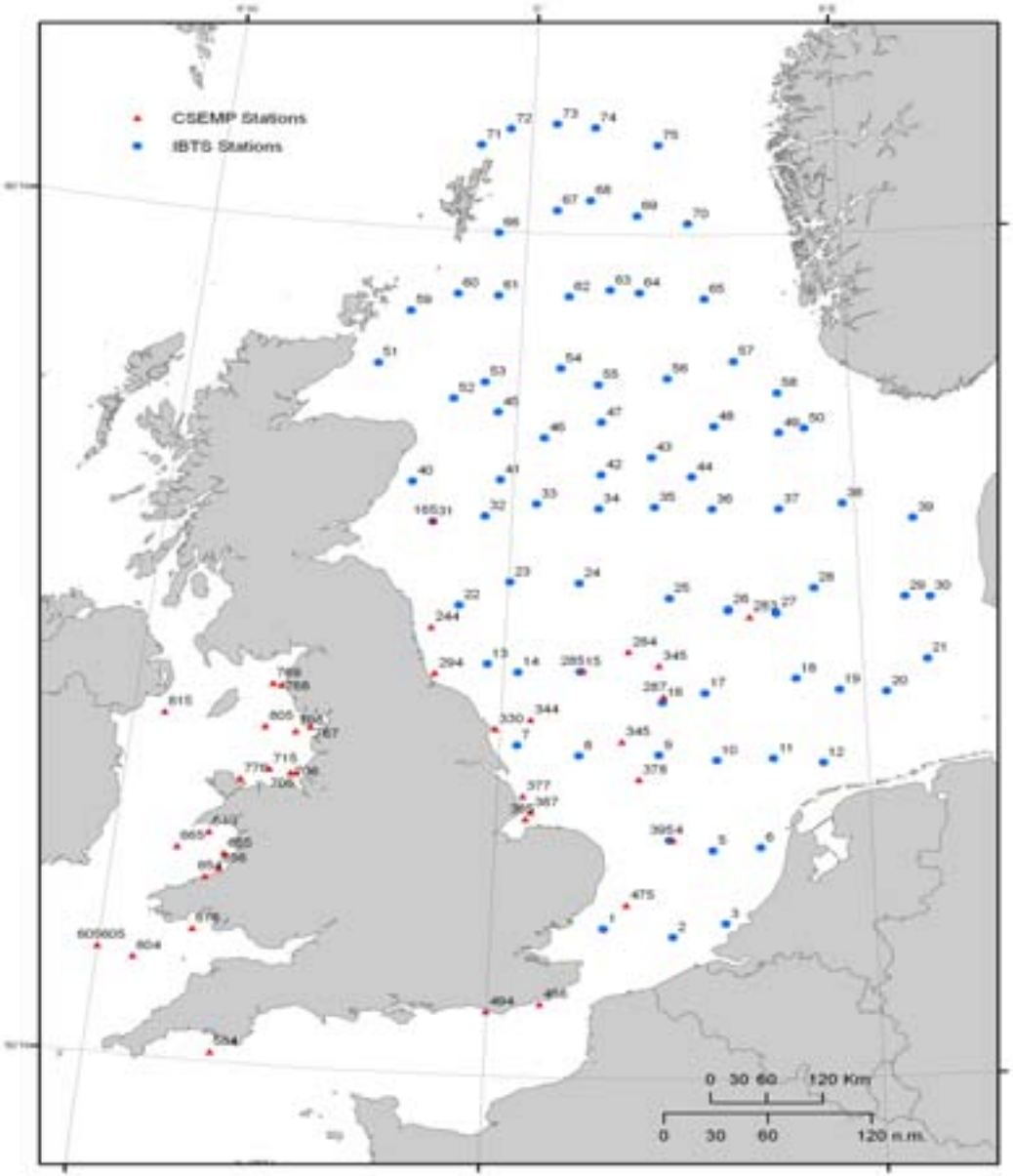

Fig. 1 IBTS and CSEMP sampling stations

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Methods on data collection

IBTS

- Standard GOV 36/47 groundfish otter trawl
- Trawl was towed for 30 min covering an area of 7.11 ha
- After each tow fish were removed, then litter from cod end was sorted in categories and weighed
- Data collected since 1992
  - Gaps: 2001-2004, 2006, 2007

CSEMP

- Granton trawl
- Trawl was towed for 30 min covering an area of 4.49 ha
- After each tow fish were removed, then litter from net was sorted in categories and measured
- Data collected since 2000

Litter Categories

- Plastic bags Plastic bottles Other plastic
- Paper (cardboard) Paper (other)
- Wood (natural) Wood (processed)
- Metal (cans, foil and crisp wrappers)
- Synthetic rope Natural rope
- Clothing (rags)
- Unspecified

Results

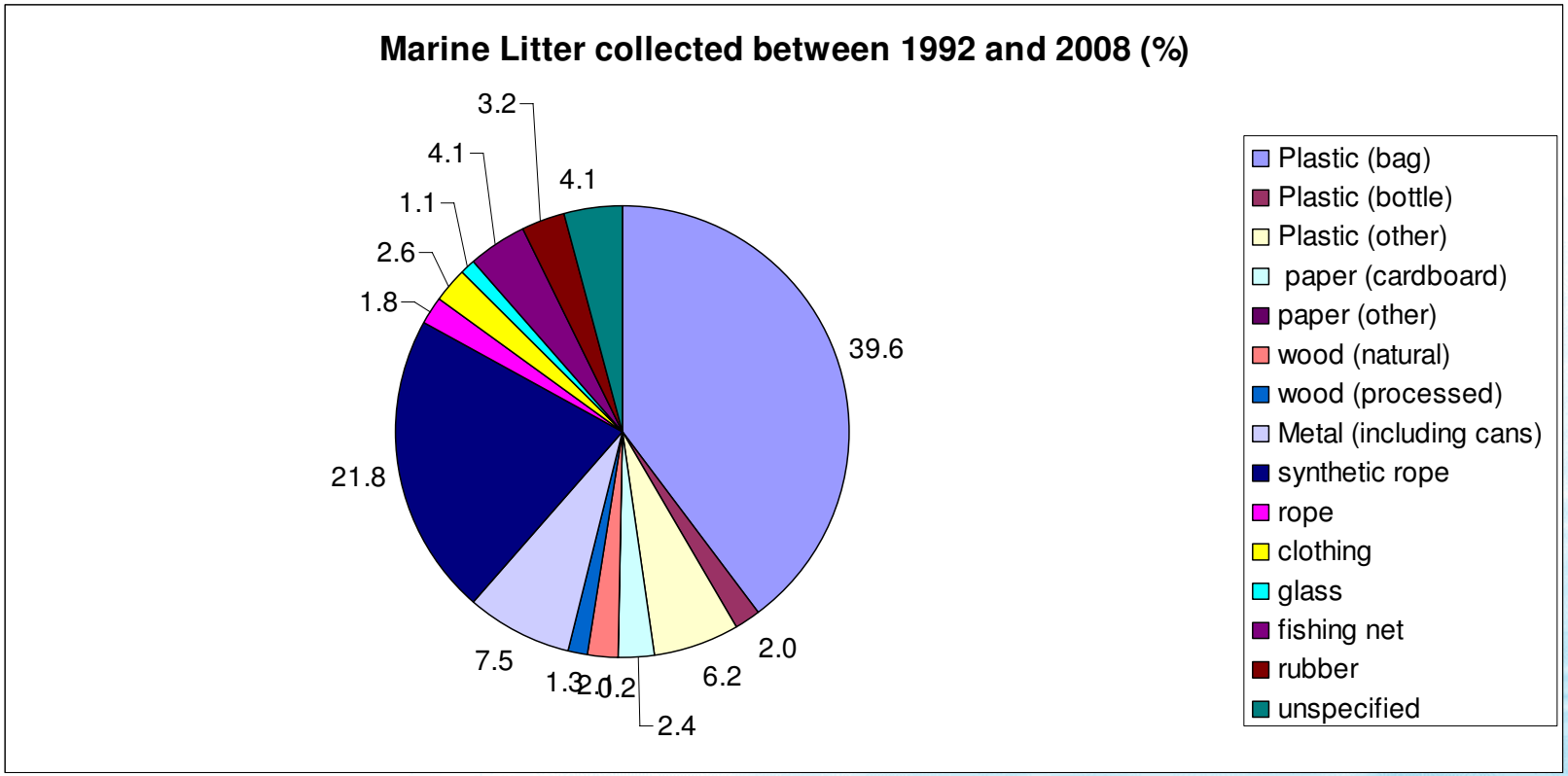

Fig. 2: Composition of Marine litter (based on total number of items) found during IBTS and CSEMP cruises between 1992 and 2008

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Results

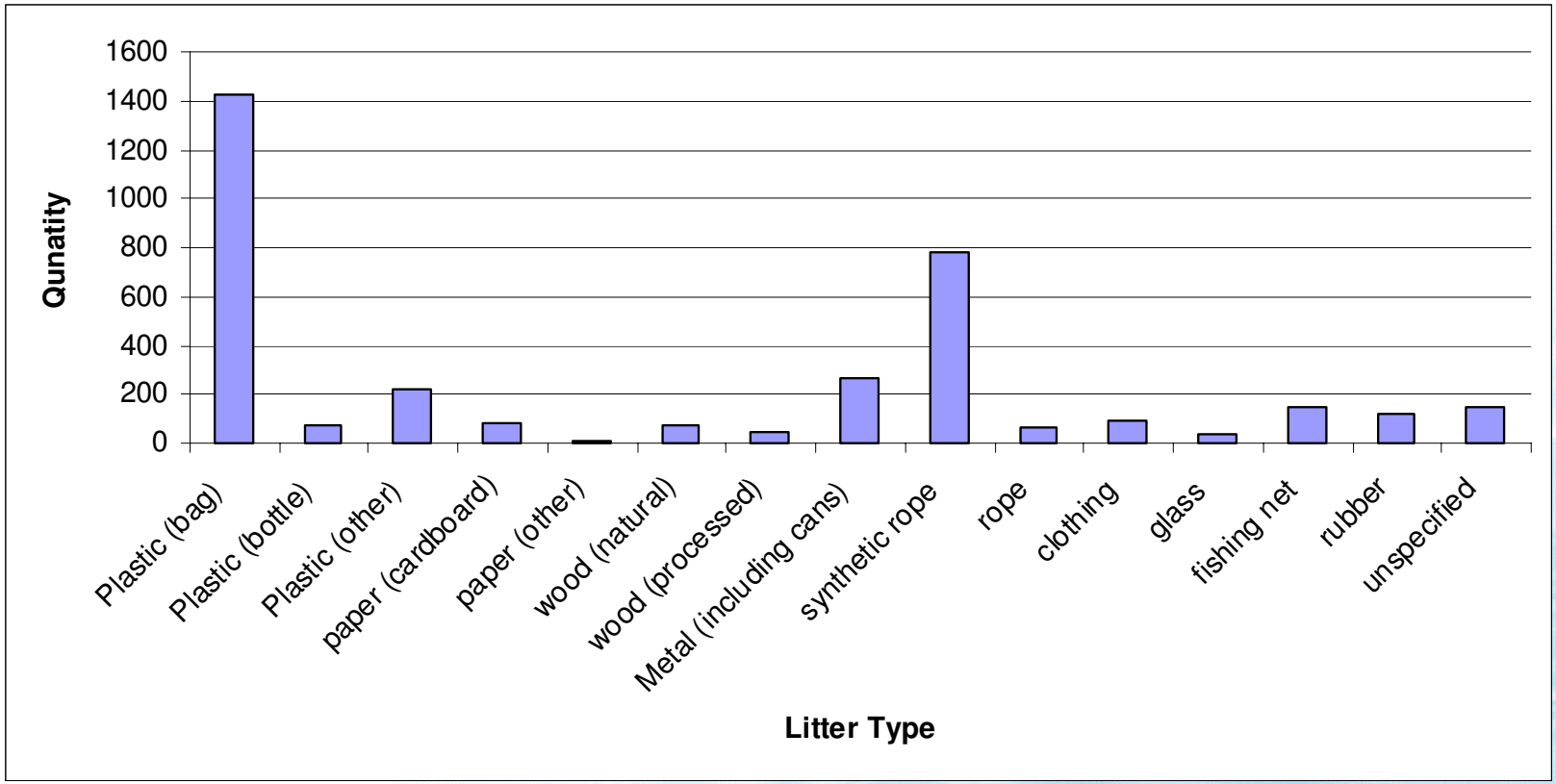

Fig. 3 Quantities of Marine Litter collected between 1992- 2008

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Results

Organisms Attached to Litter

Barnacles

Dog Whelk Eggs

Sea Anemones

Hydroids

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Results

Organisms Attached to Litter

Sea Anemones

Bryozoans

Hydroids

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Results

Organisms Attached to Litter

Barnacles

Discussion and Forward look

- Results showed that plastic bags and sheets (40%), and synthetic ropes (22%) were most abundant
  - 35% plastic and polystyrene pieces were collected during beach clean ups, and 15% rope, cord and nets (Lopez and Mouat, 2009)

Discussion and Forward look

- More detailed analysis on future cruises of organisms attached to litter may help to detect if specific litter causes harm to the environment
  - indigenous species could invade UK waters due to litter transport
  - Seals entangled in a rope (Lopes and Mouat, 2009)

- So far just benthic marine litter has been analysed
  - More studies need to be carried out on pelagic litter

Discussion and Forward look

- Litter recording made easy
- Which litter categories and sub-categories should be used?

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References

- Lopez Lozano, R. and Mouat, J. 2009. Marine litter in the North-East Atlantic Region. KIMO International Regional Consultants.