



House of Commons
Environmental Audit Committee

Environmental impact of microplastics

Fourth Report of Session 2016–17



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*Report, together with formal minutes relating
to the report*

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Environmental Audit Committee

The Environmental Audit Committee is appointed by the House of Commons to consider to what extent the policies and programmes of government departments and non-departmental public bodies contribute to environmental protection and sustainable development; to audit their performance against such targets as may be set for them by Her Majesty's Ministers; and to report thereon to the House.

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Summary

Microplastics are plastic particles smaller than 5mm. They are used in some cosmetic and personal care products, and can be generated unintentionally, for example from abrasive sandblasting. Other microplastics result from the breakup of larger plastic objects in the oceans. It is estimated that a total of 15-51 trillion microplastic particles have accumulated in the ocean, with between 80,000 and 219,000 tonnes of microplastics entering the sea from Europe per year.

Our starting point for this inquiry was the significant public concern around the environmental impact of microbeads - a sub-set of microplastics that are intentionally added to cosmetic products and other toiletries, usually to exfoliate the skin. 680 tonnes of plastic microbeads are used in cosmetic products in the UK every year. Microplastics from cosmetic products are estimated to make up 0.01% to 4.1% of the total microplastics entering the marine environment. The fact that this accounts for a small percentage of total microplastic pollution in the sea does not stop it being a significant, and avoidable, environmental problem. We were told that a single shower can result in 100,000 plastic particles entering the ocean. Microbeads are also the source about which most is known. Addressing it would show commitment to reducing the wider problem of microplastics.

A large proportion of the cosmetics industry have made voluntary commitments to phase out microbeads by 2020. However, we found that a legislative ban would have advantages for consumers and the industry in terms of consistency of approach, universality and confidence. We believe that the potential risks of such an approach - e.g. disadvantaging small firms - are proportionate and can be mitigated with proper consultation. Microbeads are a transnational source of pollution and there are advantages to dealing with it on an international basis. The Government has been considering a national ban and working towards an EU ban. The outcome of the EU Referendum means their influence in that process will be significantly reduced. Nonetheless, we recommend that the Government bring forward its own legislative ban, and align it as closely as possible with international measures.

Despite the commitment by a section of the cosmetics industry to phase out microbeads we found a reluctance to talk publicly about the issue from large cosmetics manufacturers, and we found a lack of consistency in their approach. Therefore, we call on the Government to ban microbeads in the cosmetics industry, we believe this will level the playing field, and urge the Government to move swiftly towards implementation.

Microbeads are part of the wider issue of microplastic pollution. The small size of microplastics means that they can be ingested by marine life and have the potential to transfer chemicals to and from the marine environment. There is evidence of ecological damage resulting from this. If someone eats six oysters, it is likely they will have eaten 50 particles of microplastics. This is still a relatively new research area and subject to uncertainties. Relatively little research has been done so far either on potential impacts to human health or the marine economy. We recommend that the Government draw up a research strategy to assessing and mitigating microplastic pollution for the next round of research funding. Human health impacts should be a priority subject for research, along with examining ways to reduce microplastic pollution from consumer goods, such as synthetic fibres and tyres, and industrial processes, such as sandblasting.

We heard that preventing microplastics at source by stemming the flow of microplastics flushed into the oceans is the most viable option and should be the Government's key approach in its strategy. However, there are also opportunities to capture microplastics through washing machine filtration systems and waste and water sewage treatment processes. The Government and Environment Agency should work with water companies to understand whether feasible options exist to prevent microplastic pollution at this stage.

1 Introduction

1. Microplastics are generally classified as particles smaller than 5mm.¹ They are used in some cosmetic and personal care products, for example as exfoliation microbeads, and can be generated unintentionally, for example from, fibres from clothes, particles from tyres, and abrasive sandblasting.² Other microplastics result from the breakup of larger plastic objects in the oceans.³

2. The small size of microplastics means that they can end up flushed into the sea and causing damage to the marine environment. There are currently no systems to fully filter them out through waste water treatment.⁴ One study estimated that a total of 15-51 trillion microplastic particles have accumulated in the ocean.⁵ The Environmental Investigation Agency (EIA) estimated that there are between 80,000 and 219,000 tonnes of microplastics entering the marine environment from Europe per year.⁶

3. Our starting point for this inquiry was significant public concern around the environmental impact of microbeads - a sub-set of microplastics that are intentionally added to cosmetic products and other toiletries, usually to exfoliate the skin. Although microbeads are only one source of microplastic pollution, accounting for a small proportion of the overall impact, we took the view that looking at their use is an important starting point for addressing the wider issue of microplastic pollution.

4. Microplastics and their environmental impact are a relative recent subject of study. There are many areas where further research will be required. The aim of our inquiry was to investigate the scale of the problem of microplastics and establish what is known. We looked specifically at the issues of microbeads and the impact of the Government's proposed legislative ban. This also included an examination of what is known about the health consequences microplastics and the extent of the damage to our marine ecosystems.

5. A research briefing note by the Parliamentary Office of Science and Technology (POST) summarises microplastic sources and spread, the evidence that they present a risk and possible strategies to reduce plastic pollution.⁷ A briefing paper produced by the House of Commons Library also provides key information on the use of microplastics and microbeads, and their possible impacts on the environment and human health.⁸

6. The terms of reference for the inquiry can be found on our website. We held five public hearings with academics, NGOs, Cosmetics Trade Associations, Multinational Corporations, and George Eustice, Minister of State at the Department for Environment, Food and Rural Affairs (DEFRA). In addition, we received a range of written evidence,

1 Q21, Q87, Q263, Greenpeace UK ([EIM0020](#))

2 Q1, Q27, Q69, Q77, Q120

3 Brunel University ([EIM0028](#))

4 Veolia ([EIM0039](#)), United Utilities ([EIM0047](#)), Northumbrian Water ([EIM0049](#)), Thames Water ([EIM0051](#)), Yorkshire Water ([EIM0052](#)), Water UK ([EIM0055](#))

5 Environmental Investigation Agency ([EIM0022](#))

6 As above

7 Marine Microplastic Pollution, [POST Note 528](#), Parliamentary Office of Science and Technology, June 2016

8 Microbeads and microplastics in cosmetic and personal care products, [Briefing Paper Number 7510](#), House of Commons Library, May 2016

which is published on our website. A full list of witnesses can be found at the end of this report. We are grateful to all those who gave evidence to this inquiry. We would also like to thank Dr Jonathan Wentworth and Ciara Stafford from POST for their assistance.

2 Microplastic Pollution

Sources of microplastic pollution

7. Most of the world's ocean plastics by weight are large pieces of debris (e.g. fishing equipment, bottles and plastic bags). However, the dominant type of debris by quantity is microplastics.⁹ Microplastics have been reported at the sea surface and on shorelines worldwide. They are also present in remote locations including deep sea sediments and in arctic sea ice.¹⁰ The 5 Gyres Institute estimated that a total of 15-51 trillion microplastic particles have accumulated in the ocean, weighing between 93 and 236 thousand metric tonnes.¹¹ The large variations in the estimates are because of scarcity of data, differences in models, and fundamental knowledge gaps.¹²

8. One source of microplastics arises from the breakdown of larger plastics. This happens due to the action of catalysing factors such as ultraviolet light, which can alter bonds in the plastic polymers.¹³ Dr van Sebille, Imperial College London, argued that “degradation is always happening and big plastics become smaller and, [...], small plastics have bigger impacts.” He added that microplastic are “more damaging in general than larger plastics that break up as they move through the ocean.”¹⁴ Similarly, Professor Galloway, University of Exeter, said:

I think the issue is that as you break things down into smaller and smaller particles you increase the surface area. The surface area is where plastics can interact with chemicals and other things in the ocean and it is also the surface area from which things can leach out into the environment. [...] One other thing to say is that microplastics overlap with the size range of food items for a lot of the creatures and animals that are at the base of the marine food web and that is the issue. It means that the plastics can be ingested.¹⁵

9. One of plastics' greatest properties, its durability, is also one of the main reasons that it presents a threat to the marine environment when it becomes waste.¹⁶ The release of plastic into the marine environment has resulted in the rapid accumulation of persistent marine plastic debris in the world's oceans.¹⁷ A 2014 report by the Norwegian Environment Agency estimated that the largest source of microplastic pollution was abrasion from tyres and road markings.¹⁸ Another major source was synthetic fibres from clothing, which are released into the wastewater environment from the effluent of washing machines in numbers as great as 1900 fibres per garment.¹⁹ Professor Kelly, King's College London, said a lot of fibres “will contain various additional chemicals to give them additional properties

9 5 Gyres Institute ([EIM0017](#))

10 Plymouth Marine Laboratory ([EIM0008](#)), Royal Society of Chemistry ([EIM0019](#)), Environmental Investigation Agency ([EIM0022](#)), Brunel University ([EIM0028](#)), Professor Richard Thompson ([EIM0053](#))

11 5 Gyres Institute ([EIM0017](#))

12 Marine Microplastic Pollution, [POST Note 528](#), Parliamentary Office of Science and Technology, June 2016

13 Dr Natalie Welden ([EIM0003](#)), Plymouth Marine Laboratory ([EIM0008](#)), 5 Gyres Institute ([EIM0017](#)), Grantham Institute, Imperial College ([EIM0027](#)), Richard Shirres ([EIM0031](#))

14 Q23

15 Q18

16 Dr Natalie Welden ([EIM0003](#))

17 Marine Microplastic Pollution, [POST Note 528](#), Parliamentary Office of Science and Technology, June 2016

18 Novamont ([EIM0035](#))

19 Plymouth Marine Laboratory ([EIM0008](#)), University of Exeter ([EIM0009](#)), Marine Conservation Society ([EIM0025](#)), Brunel University, London ([EIM0028](#)), Thomas Stanton ([EIM0033](#))

and it will depend on what they have been mixed up with and what the components are on the fibres, so that will influence their degradability [...].”²⁰ Dr van Sebille, also suggested that fibres were going to be a very difficult problem to address as “garments have a use and are there because they work very well.”²¹ He further stated:

I feel that solving the fibre problem might mean engineering solutions, where it is about better filtering of wastewater treatment plants. [...] civil engineering can do something at some point about taking these fibres out in a better way.²²

In Europe, the Environment Investigation Agency estimates that there are between 68,500 and 275,000 tonnes of larger plastics (with the potential to fragment into microplastics) annually entering the marine environment.²³ According to the Grantham Institute, Imperial College London, the total amount of plastic floating on the ocean surface is between 7,000 and 236,000 metric tonnes, whilst the amount of plastic entering the ocean in the year 2010 alone was 4.8 to 12.7 million tonnes.²⁴ Dr Erik van Sebille, highlighted this discrepancy:

The large gap between the amount of plastic entering the ocean and the amount floating is because more than 99% of all ocean plastic is in reservoirs other than on the surface—the water column and ocean floor, [and] beaches.²⁵

10. The majority of witnesses agreed that a significant proportion of marine litter was originally lost or disposed of on land before being blown or washed into the marine environment. DEFRA estimated this could be around 80%.²⁶ There is also uncertainty over the identity of the major sources of microplastic pollution. A report by the Marine Conservation Society on beach litter showed that the source of 44% of litter items could not be categorised.²⁷ In addition, UN GESAMP found that research on the potential ecological risks of microplastics was relatively new and that there was “a large degree of uncertainty surrounding this issue.”²⁸

11. Different sizes of larger plastic objects can also lead to different impacts on the marine environments.²⁹ There is limited information on the extent to which impacts vary according to the source or type of microplastic. Professor Richard Thompson, Plymouth University, states:

Discharges from point sources such as sewage plants, plastic processing factories and rivers can be identified. However, once in the environment it would appear that microplastics can move substantial distances, and accumulate in remote locations.³⁰

20 Q6

21 Q13

22 As above

23 Environmental Investigation Agency ([EIM0022](#))

24 Grantham Institute, Imperial College ([EIM0027](#))

25 As above

26 DEFRA ([EIM0034](#))

27 Marine Conservation Society ([EIM0025](#))

28 ‘Sources, fate and effects of microplastics in the marine environment: a global assessment’, GESAMP, 2015.

29 Marine Conservation Society ([EIM0025](#))

30 Plymouth University ([EIM0011](#))

DEFRA argues that “disentangling the effects of microplastics from the effects of these other factors is unlikely to be possible in the marine environment.”³¹ They state:

For larger items, it is frequently possible to identify what type of plastic (eg polyethylene, polypropylene) a particular piece of ocean debris is made of. However, when pieces become small and fragmented they are almost impossible to trace to their original source.³²

12. Witnesses agreed that microplastic pollution in the marine environment originated from both land and marine-based sources. Although academic witnesses highlighted that microplastics are a transnational issue, Professor Richard Thompson, Plymouth University, states that “there is also evidence that substantial quantities of litter can remain on coastlines close to points of entry to the sea.”³³

13. **There is significant public concern around microbeads, however, they make up a small proportion of total microplastic pollution. The wider issue of microplastic pollution cannot be set aside once microbeads have been dealt with. We recognise the research is still relatively new and subject to uncertainties. We recommend that the Government work towards a systematic strategy for researching and mitigating sources of microplastic pollution. We suggest that synthetic fibres and tyres are two sources that should be examined at an early stage.**

Microplastic environmental and health impact

Marine environment pollution

14. The small size of microplastics means that they can be ingested by marine life. It is difficult to make predictions about the risks of ingesting microplastics due to the variety of composition, shape and size.³⁴ Toxicity could be caused by the plastic polymer itself, the additives it contains, or by other chemicals that associate with microplastics when they are in the ocean.³⁵ UN GESAMP list the potential effects of microplastics on marine organisms as follows: physical effects such as obstruction; chemical effects due to transportation of toxic chemicals; impaired health; impacts on population and ecosystems; and dispersal of damaging pathogens.³⁶

15. There have been experiments into the effect of plastic ingestion for marine species, although some of these experiments expose animals to a higher concentration of microplastics than has been reported in marine ecosystems.³⁷ The magnitude of effects and life stages at which they are affected varies between species.³⁸ There are also many other marine environmental pressures which make it difficult to isolate the sole effect of microplastics upon marine species.³⁹

31 DEFRA ([EIM0034](#))

32 As above

33 Plymouth University ([EIM0011](#))

34 Rame Peninsula Beach Care ([EIM0007](#)), DEFRA ([EIM0034](#))

35 Marine Microplastic Pollution, [POST Note 528](#), Parliamentary Office of Science and Technology, June 2016

36 ‘[Sources, fate and effects of microplastics in the marine environment: a global assessment](#)’, GESAMP, 2015.

37 Plymouth University ([EIM0011](#)), DEFRA ([EIM0034](#))

38 Environmental Investigation Agency ([EIM0022](#))

39 DEFRA ([EIM0034](#))

16. Microplastics are ingested by a wide range of wild life, and also commercially farmed species. According to Fidra, an environmental charity, some microplastics pellets in the range of 2-3mm can be mistaken for fish eggs by marine wildlife and seabirds, such as puffins.⁴⁰ Plastic particles can be trapped in the stomach for several months and lead to weight loss and malnutrition.⁴¹ Over 280 marine species have been found to ingest microplastics, including many with important roles in food chains and the functioning of marine ecosystems.⁴² Microplastics can be ingested by mussels, crabs, zooplankton, and sea squirts.⁴³ There is evidence that ingestion of microplastics can lead to reduced feeding rates, less energy for growth and lower reproduction. The magnitude of effects varies between species, and some animals appear only to be affected at certain stages of their lifecycle.⁴⁴ In an experiment conducted by Dr Dannielle Senga Green, University of Warwick, repeated exposure to a sedimentary habitat associated with flat oysters found that there was a reduction in important grazing organisms, such as juvenile periwinkles and isopods.⁴⁵ A reduction in these organisms could have knock-on effects on marine ecosystems.

17. Professor Richard Thompson, Plymouth University, in a study of 504 fish from the English Channel, found that over one-third of the fish examined had plastic in their digestive tract.⁴⁶ He also found that some species of seabirds had ingested larger quantities. Dr van Sebille, Imperial College London, also conducted a study on the effect of plastics on birds and seabirds. He said:

We found that 80% of seabird species ingest plastic into their stomach, and that if you weigh that plastic, the amount of plastic that a typical seabird now carries around can be up to 10% of their body weight.⁴⁷

18. There are other environmental concerns which are not related to ingestion of microplastics. For example, microplastics can provide a surface for marine insects to lay their eggs.⁴⁸ This could lead to an increase in certain species and a potential disruption in ecosystems.⁴⁹ According to Brunel University, microplastics can also host microbial communities and can transport pathogens such as the *Vibrio* strain of bacteria, which could have an impact on wildlife health.⁵⁰ The community of microbes associated with plastic fragments is different to that normally found in seawater, which could have ecological consequences.⁵¹ Professor Tamara Galloway argues:

We know very little about the transfer of plastics from surface waters to the rest of the marine environment. [...] Little is known of the transfer of microplastics across the gut into tissues and the transfer of associated chemicals. We need to understand the pathways, mechanisms and effects.⁵²

40 Fidra ([EIM0012](#))

41 Shay Fennelly ([EIM0004](#))

42 University of Exeter ([EIM0009](#))

43 University of Exeter ([EIM0009](#)), Fauna & Flora International ([EIM0016](#)), Environmental Investigation Agency ([EIM0022](#)), Marine Conservation Society ([EIM0025](#)), Brunel University, London ([EIM0028](#)), DEFRA ([EIM0034](#))

44 Marine Microplastic Pollution, [POST Note 528](#), Parliamentary Office of Science and Technology, June 2016

45 Dr Dannielle Green ([EIM0040](#))

46 Plymouth University ([EIM0011](#))

47 Q41

48 DEFRA ([EIM0034](#))

49 Marine Microplastic Pollution, [POST Note 528](#), Parliamentary Office of Science and Technology, June 2016

50 Brunel University, London ([EIM0028](#))

51 Marine Microplastic Pollution, [POST Note 528](#), Parliamentary Office of Science and Technology, June 2016

52 University of Exeter ([EIM0009](#))

19. Although some studies have shown that plastics can transfer chemicals to organisms upon ingestion, it is not known to what extent this could result in harmful effects.⁵³ DEFRA state:

The evidence base on the effects of micro-plastics in the marine environment is limited. However, they do not biodegrade, they accumulate in the marine environment, they can absorb toxic chemicals and pathogens, and their small size means they have the potential to be ingested by marine organisms.⁵⁴

20. The impacts on the marine environment are still being researched. However, there is evidence that there is scope for significant harm to the marine environment. Microplastic pollution is potentially more environmentally damaging than larger pieces of plastic because small pieces of plastic are more likely to be eaten by wildlife and have a greater surface area which can transfer chemicals to and from the marine environment.

Impact on human health

21. It is uncertain whether microplastics that are ingested by humans can be transported into tissues. Microplastics are widely used as carriers for medicines, and can transfer into tissues in humans. Thomas Maes, CEFAS told us:

There is lots of research available from the other side - the medicine side. They use microplastics as carriers for medicines... as vectors for delivering medicines to those areas where they want them to be active.⁵⁵

He went on to say:

[The evidence] shows it could transfer to several layers of the human body, in simple layman's terms. [...] If [microplastics used in medicine] can transfer to certain tissues to deliver the medicine, then it could also transfer to the tissues without the medicine, I would assume.⁵⁶

22. Microplastics are present in seafood sold for human consumption, such as mussels from the North Sea.⁵⁷ It is possible that the gut wall could stop microplastics from entering tissues, but very small particles could potentially pass through.⁵⁸ Evidence submitted by DEFRA said that the smallest particles, known as nanoplastics, can even permeate cell membranes, as well as gut tissues.⁵⁹ Once inside tissues, it is theoretically possible for microplastics to interact with biological tissues in a toxic manner, but this has not been tested.⁶⁰

53 Fauna & Flora International ([EIM0016](#)), Royal Society of Chemistry ([EIM0019](#)), Brunel University, London ([EIM0028](#))

54 DEFRA ([EIM0034](#))

55 Q349

56 Q361

57 King's College London ([EIM0014](#)), 5 Gyres Institute ([EIM0017](#)), Environmental Investigation Agency ([EIM0022](#)), Marine Conservation Society ([EIM0025](#)), DEFRA ([EIM0034](#))

58 King's College London ([EIM0014](#)), Brunel University, London ([EIM0028](#))

59 DEFRA ([EIM0034](#))

60 Marine Microplastic Pollution, [POST Note 528](#), Parliamentary Office of Science and Technology, June 2016

23. An essential factor determining whether microplastics present a physical threat and/or act as a vector for transferring chemicals is the ability for these particles to be absorbed. Smaller particles are more readily absorbed.⁶¹ Dr Stephanie Wright and Professor Frank Kelly, King's College London, states:

Given the novelty of this research area, there is a lack of information concerning the post-ingestion particle and chemical toxicity of micro and nanoplastics in humans. If micro and nanoplastics are capable of bioaccumulating, they present a long-term source of chemicals to tissues and fluids. This is of concern as some additives [...] have human health effects.⁶²

24. Microplastics are typically reported in the gut of marine organisms. In many food uses the gut is removed prior to consumption.⁶³ Shellfish are exceptions and one recent study by Van Cauwenberghe et al., (2015) suggested that consumption of large quantities of mussels could present an exposure pathway.⁶⁴ However, these studies have not yet shown measurable harm.⁶⁵ DEFRA highlighted that no studies have investigated whether microplastics can be unintentionally ingested by humans and subsequently transported into tissues.⁶⁶ They further state:

Even for high level consumers of seafoods that are most likely to be relatively highly contaminated with marine microplastics, such as mussels or crab, dietary exposure to microplastic particles is likely to be relatively low compared with inhalation of microplastics.⁶⁷

We heard that if someone eats six oysters, it is likely they will have eaten 50 particles of microplastics.⁶⁸

25. Several NGOs told us a precautionary approach should be applied to reduce the risks to human health arising from microplastics.⁶⁹ The EIA state:

There is a clear risk that marine microplastics in seafood could pose a threat to human health, however the complexity of estimating microplastic toxicity means that quantification of the risks is not yet possible. [...] Future studies should focus on assessing the fate and toxicity of microplastics in humans and assessing dietary exposure across a range of foods."⁷⁰

26. *There is little evidence on potential human health impacts of microplastic pollution. What evidence there is suggests that dietary exposure is likely to be low. Further research in this area is underway and is clearly required. The Government should set out a timescale within which it will publish an assessment of the potential health impacts and any measures it intends as a response.*

61 King's College London ([EIM0014](#))

62 As above

63 Plymouth University ([EIM0011](#))

64 Professor Richard Thompson ([EIM0053](#))

65 King's College London ([EIM0014](#))

66 DEFRA ([EIM0034](#))

67 As above

68 Q51

69 Q87, Q102, Q107, Q108, Q110

70 Environmental Investigation Agency ([EIM0022](#))

Economic consequences of microplastic pollution

27. There have been wide ranging estimates to the economic impacts of microplastics to the UK and EU. The MCS highlighted that marine litter can cause “serious economic damage that manifests itself as direct losses for coastal communities, tourism, shipping and fishing.”⁷¹ They state:

Potential costs across the EU for coastal and beach cleaning was assessed at almost €630 million per year, while the cost to the fishing industry could amount to almost €60 million, which would represent approximately 1% of total revenues of the EU fishing fleet in 2010.⁷²

They add:

Sector costs could also be incurred if ingested microplastics affect commercial fish and shell fish stocks, or sales as the public become more aware of the issue and express concern through their shopping habits.⁷³

These costs include the cost of clean-ups, loss of fisheries and wildlife, reductions in tourism, damage to vessels and the rescue costs and human health risks associated with damaged vessels.⁷⁴ In the UK, World Animal Protection UK stated:

Municipalities spend approximately €18 million each year removing beach litter and in 2008 there were 286 rescues in UK water of vessels with fouled propellers; incurring a total cost of between €830,000 and €2,189,000.⁷⁵

The EIA highlighted that estimates of the overall financial damage of plastics, without extrapolating the impact of microplastics, to marine ecosystems stand at US\$13 billion each year.⁷⁶ Dr Foster, Marine Conservation Society, highlighted that the large range of economic costs comes from including impacts on the shellfish and tourism industry.⁷⁷ However, there are benefits to tackling microplastic pollution in the marine environment. The MCS estimated that £250 million pounds could be saved if microplastics were not present in the marine environment.⁷⁸

28. CEFAS cited the MICRO project as the first attempt at defining economic impacts of microplastics on UK aquaculture (oyster) industry in the Channel region reported that it cost between £1.5M - £500M.⁷⁹ The Government said:

There has been little assessment of the potential economic consequences of increased microplastics in the ocean. However an economic analysis demonstrated that there are potential costs associated with microplastics to

71 Marine Conservation Society ([EIM0025](#))

72 As above

73 As above

74 Brunel University, London ([EIM0028](#))

75 World Animal Protection UK ([EIM0013](#))

76 Environmental Investigation Agency ([EIM0022](#))

77 Q118

78 Marine Conservation Society ([EIM0025](#))

79 CEFAS ([EIM0023](#))

the aquaculture sector in the UK. Removal of microplastics from the marine environment is currently considered to be prohibitively expensive and technically infeasible.⁸⁰

The Government adds:

There is widespread agreement that the most effective way to reduce microplastic pollution is to focus on preventing plastic from entering the marine environment in the first place (both microplastics and larger pieces of debris that will eventually fragment into microplastics).⁸¹

Professor Richard Thompson highlighted the need for policy prioritisation. He stated:

There is limited information on the extent to which impacts vary according to the source or type of microplastic. [...] more work would be needed to establish a risk assessment based on microplastic type, size or shape.⁸²

He added:

On the basis of current knowledge it would be difficult to prioritise policy measures according to differences in the severity impacts according to microplastic type.⁸³

29. The Committee heard that studies estimating the economic costs of microplastic pollution vary widely. As with the health impacts, the Government should set out a timescale in which it intends to produce a more accurate assessment. It should also ensure that microplastics are treated as an economic issue - within the scope of its food and farming strategy - as well as an environmental one.

International cooperation and future trends

30. The United Nations Sustainable Development Goal 14.1 is focused on ocean pollution.⁸⁴ The Goals challenge countries over the next 15 years to take action to address critical issues including ocean plastic. International cooperation on tackling marine litter is also managed through a range of groups, conventions and legal instruments.⁸⁵ According to DEFRA, the main ones are:

- a) The EU Marine Strategy Framework Directive (MSFD): This is the overarching policy framework for addressing marine litter. A Technical Group on Marine Litter (TG-ML) provides guidance on targets, monitoring and measures.
- b) MARPOL (the International Convention for the Prevention of Pollution from Ships): Annex 5 of the convention specifically deals with marine litter and prohibits the disposal at sea of all forms of plastic.

80 DEFRA ([EIM0034](#))

81 As above

82 Plymouth University ([EIM0011](#))

83 As above

84 5 Gyres Institute ([EIM0017](#)), Environmental Investigation Agency ([EIM0022](#))

85 5 Gyres Institute ([EIM0017](#))

- c) The Oslo and Paris Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR): A regional seas convention facilitating cooperation between contracting parties.
- d) The G7 group: The UK also works with the other G7 countries to address marine litter.⁸⁶

Thomas Maes, CEFAS, also highlighted ongoing research through the Joint Programming Initiative Oceans, which is European-led. He said:

They look at degradation of microplastics and plastics—how that happens. They also look at standardisation of techniques across the world and they look at impacts on animals.⁸⁷

31. However, FFI argue that the non-governmental sector has taken the lead on international co-operation around microplastic pollution. They state:

The collection and public dissemination of microplastic data has been effective in driving corporate change and mitigating one of the most unnecessary inputs of microplastics to freshwater and marine environments.⁸⁸

They also believe that an agreed monitoring framework for the mitigation of this source of microplastic is key to driving further industrial innovation in preventing microplastic emission.⁸⁹ However, they add:

The NGO monitoring of these products and the companies that produce them—and the non-statutory funding that pays for this monitoring—are not sustainable in the long-term.⁹⁰

32. Academic witnesses said a huge amount of research is currently taking place to try and ascertain the dangers of microplastics.⁹¹ This is a complicated and difficult task given the inherent complexities in biological systems and their interactions with the environment.⁹² However, they argued that there was progress. Dr van Sebille said, “even though there are lots of things we don’t know, we are very much on track to understanding this.”⁹³ Similarly, Professor Kelly said, “I think it is a gradual accumulation of evidence and a realisation that [microplastics are] another thing we are doing to our environment that we really should not be doing.”⁹⁴

33. It is important to address microplastic pollution as a transnational problem and to understand that plastic in the ocean is in constant motion. The Government should continue international cooperation despite uncertainties arising from the EU referendum. It is clear that international action is needed. We recommend the Government maintain existing cooperation with international partners in tackling microplastic pollution. Up to now, NGOs have taken the lead role in addressing this

86 DEFRA ([EIM0034](#))

87 Q357

88 Fauna & Flora International ([EIM0016](#))

89 As above

90 As above

91 Q28, Q32, Q37, Q60

92 Q6

93 Q32

94 Q1

issue. However, this is unsustainable given the increasing costs and demands relating to microplastic pollution. As more evidence emerges about the impact of microplastic pollution, the Government must take on that role.

3 Microbeads

Microbeads and wider microplastic pollution

34. Microbeads are a sub-category of microplastics, commonly manufactured for domestic use in cosmetic scrubs, toothpastes, and cleaning products.⁹⁵ The UK Cosmetics, Toiletry and Perfumery Association (CTPA) define plastic microbeads as:

Any intentionally added, 5mm or less, water insoluble, solid plastic particle used to exfoliate or cleanse in rinse-off personal care products.⁹⁶

35. Microbeads became popular in personal care products in the 1990s when they were seen as an easy and versatile formulation by companies.⁹⁷ Cosmetics companies added them to their personal care product portfolios, including cosmetics, lotions, face washes, toothpastes, shampoos, sunscreens, shaving creams and exfoliators. They allowed greater control over the consistency of product as compared to natural alternatives.⁹⁸ Dr Laurent Gilbert, L’Oreal, said:

[Microbeads] are much more producible in terms of particulate size and exfoliation properties than the kernel powders that we used before, so that is the reason why and availability was also something that was important. [...] It was really about their physical chemical properties, their versatility and the fact that you can formulate them in many different textured products without any difficulty. That is much more complex with kernel products.⁹⁹

36. As a result of their small size, microbead particles can travel through wastewater sewage treatments into the ocean, causing marine environmental damage.¹⁰⁰ Professor Richard Thompson, University of Plymouth, cited a study that estimated that 680 tonnes of microbeads are used annually in cosmetic products in the U.K.¹⁰¹ He also cited another study which estimated that a single 150ml container of cosmetic product could contain around 3 million plastic particles.¹⁰² Professor Galloway, University of Exeter, said, “every time you take a shower that does not have microbeads in it, you would have 100,000 fewer particles washing down the sink.”¹⁰³ The Committee also heard from academics who all emphasised that microbeads, like other microplastics, do not biodegrade and therefore accumulate in the marine environment.¹⁰⁴

37. Microbeads are a growing area of public concern with a recent Greenpeace petition calling for a UK ban attracting more than 300,000 signatures.¹⁰⁵ Our evidence suggests there is a broad public consensus that plastic microbeads should be phased out of cosmetic products.

95 Plastic Ocean ([EIM0021](#)), DEFRA ([EIM0034](#)), Veolia ([EIM0039](#))

96 The Cosmetic Toiletry & Perfumery Association ([EIM0038](#))

97 Q170, Q419, Q452, Q469, Q487

98 Q8, Q78, Q237

99 Q469

100 Plymouth University ([EIM0011](#))

101 As above

102 As above

103 Q7

104 Q41, Q43, Q282

105 Q92, Greenpeace UK ([EIM0020](#))

38. There is limited scientific literature available that assesses the relative impact of microbeads compared to overall microplastics in the ocean.¹⁰⁶ According to DEFRA, microplastics from cosmetic products make up a small percentage of the total of microplastics entering the marine environment, with estimates ranging from 0.01% to 4.1%.¹⁰⁷ They argue, “A ban in the UK would therefore be expected to have only a small impact on the environmental situation around microplastics.”¹⁰⁸ The Marine Conservation Society (MCS) also noted the upper end of DEFRA’s estimate, arguing that cosmetic microplastics could be contributing between 2,461 and 8,627 tonnes per year to the marine environment across Europe.¹⁰⁹ The Cosmetics, Toiletry and Perfumery Association (CTPA) note that eradicating microbeads from cosmetics would have a minor impact on the problem as a whole in the absence of robust measures to tackle the major sources.¹¹⁰ The British Plastics Federation (BPF) argued that a microbead ban would have a relatively low impact on the much larger challenge of plastic pollution.¹¹¹ However, Professor Galloway argued that the number of microbeads is a more important measurement framework than the total mass.¹¹² Professor Thompson added, “It might be small in percentages, but to me what that illustrates is the scale of the wider problem, rather than trivialising the issue relating to microbeads as a source.”¹¹³

39. Experts have estimated that around 680 tonnes of plastic microbeads are used in the UK every year. A single shower can result in 100,000 plastic particles entering the sewage system. Microplastics from cosmetic products are believed to make up 0.01% to 4.1% of the total microplastics entering the marine environment. The fact that this accounts for a small percentage of total microplastic pollution in the sea does not stop it being a significant and avoidable environmental problem, and possibly a low-hanging fruit in the context of tackling wider plastic pollution.

Voluntary commitments

40. According to Fauna & Flora International (FFI), there are currently 25 UK companies that are, or intend to become, microbead-free.¹¹⁴ On 21st October 2015, Cosmetics Europe, the personal care trade association, issued a recommendation to their member companies to “discontinue [microbead] use in cosmetics that are most likely to end up in the aquatic environment and for which alternatives exist.”¹¹⁵ They stated:

Cosmetics Europe recommends its membership to discontinue, in wash-off cosmetic products placed on the market as of 2020: The use of synthetic, solid plastic particles used for exfoliating and cleansing that are non-biodegradable in the marine environment.¹¹⁶

106 Grantham Institute, Imperial College ([EIM0027](#))

107 DEFRA ([EIM0034](#))

108 As above

109 Marine Conservation Society ([EIM0025](#))

110 The Cosmetic Toiletry & Perfumery Association ([EIM0038](#))

111 British Plastics Federation ([EIM0041](#))

112 Q17

113 Q270

114 Fauna & Flora International ([EIM0016](#))

115 Cosmetics Europe ([EIM0032](#))

116 ‘Cosmetics Europe recommendation on solid plastic particles (plastic micro particles), [Cosmetics Europe Press Release](#), 21 October 2015

John Chave, Cosmetics Europe, said that this recommendation “applies” to 90% of their membership.¹¹⁷ CTPA, which represents 80-85% of the UK cosmetics market by value, argued:

This course of action was chosen because it would have an impact far more quickly than waiting for any legislative ban. Although the date for final removal was stated at 2020, the majority of use would be discontinued long before then.¹¹⁸

41. The phase-out of microplastic ingredients also extends to the retail industry. The British Retail Consortium (BRC) reported that many retailers are phasing out microbeads from their own-brand products, including Aldi, Asda, Asos, Boots, M&S, Morrisons, Next, Sainsbury’s, Tesco and Waitrose.¹¹⁹ However, BRC adds that their members can only dictate the composition of their own products.¹²⁰ For other products, they state:

Whilst retailers will know the composition of their own brand products, retailers are not informed of the composition of branded products aside from any information that brands are legally obliged to provide. While retailers can put pressure on brands regarding the composition of products, they are not in a position to dictate this.¹²¹

42. The Committee heard from large cosmetics industry companies which planned to take action before the 2020 target. Johnson & Johnson told us that they had replaced ‘half [of their] products sold’ based on their 2015 commitments, and further stated, “Our goal is to remove microbeads from our products globally by the end of 2017.”¹²² Similarly, L’Oreal said they had already phased-out microbeads in their two brands ‘Biotherm’ in 2014 and ‘The Body Shop’ in 2015.¹²³ They said they would extend this to the whole Group’s portfolio “[by] no longer [using] microbeads of polyethylene in its scrubs by 2017.”¹²⁴ Procter & Gamble also plan “to remove polyethylene microbeads from all [...] cleansers and toothpastes by 2017.”¹²⁵ Dr Masscheleyn, Procter and Gamble, said, “We are on track to remove all plastic microbeads from our products by the end of this calendar year, so we are just a few months away from total elimination.”¹²⁶ Out of the companies we heard from, Unilever were the only business who had completed their phase-out so far.¹²⁷ Ian Malcomber, Unilever, said:

We have completed our phase out. We committed to the phase out in 2012. We were one of the first companies to do that. We gave ourselves a two-year deadline to do that and we completed that at the end of 2014.¹²⁸

117 Q165

118 The Cosmetic Toiletry & Perfumery Association ([EIM0038](#))

119 British Retail Consortium ([EIM0037](#))

120 As above

121 British Retail Consortium ([EIM0037](#))

122 Johnson & Johnson ([EIM0042](#))

123 L’Oreal ([EIM0043](#))

124 As above

125 ‘[What are Microbeads?](#)’, Procter & Gamble

126 Q406

127 Q407

128 Q407

43. Despite the voluntary commitments, NGOs argued that there are inconsistencies in the approach taken by the companies in phasing out microbeads.¹²⁹ FFI argued that microplastics remained in personal care and cosmetic products, in spite of the existence of voluntary commitments in this sector.¹³⁰ They found that 16% of over 1,300 UK personal care and cosmetic products randomly sampled by them contained solid microplastic ingredients.¹³¹ They also conducted an evaluation of existing commitments against criteria which they considered necessary to constitute a robust and meaningful commitment.¹³² These criteria included: the phasing out of all solid microplastic ingredients, across all products that go down the drain, applying to all of the company's brands, all of the markets it is active in, all future formulations of those products, with no exemption for biodegradable plastics or and no lower size limit for the particle being phased out.¹³³ We heard from Daniel Steadman, Fauna & Flora International, who argued that at least seven major multinational brands have failed at least one of these criteria.¹³⁴ He said:

It might be that they made these commitments when the understanding of the issue wasn't at maturity, but [...] this causes consumer confusion. [Consumers] might be aware that their favourite brand has phased out microbeads, but actually what that company's definition of microbeads is too narrow to be adequately dealing with the problem.¹³⁵

Professor Thompson also said the criteria and definitions used in the wording of the ban are important:

The term microbead is an industry phrase lacking a definition of clear relevance to the problems of microplastic in the environment. Legislation in some other countries may have inadvertently left ambiguity and we need to be sure this is not the case in the UK.¹³⁶

44. Whilst the majority of witnesses, including the Government, supported voluntary phase-out by cosmetic companies, NGOs had concerns regarding the time frame and commitment levels.¹³⁷ For example, The Cornwall Plastic Pollution Coalition welcomed companies that had pledged to stop using plastic microbeads but emphasised that "a voluntary industry phase out by 2020 is too slow and will be too patchy."¹³⁸ They argue:

The weaknesses of voluntary industry action can be seen in Operation Clean Sweep, the plastic industry scheme to prevent pollution from UK plastics plants through loss of pre-production pellets. After seven years this has still only been signed by 53 out of over 3,000 companies.¹³⁹

45. We welcome the commitment by a section of the cosmetics industry to phase out microbeads. However, the commitment is not universal, and there are inconsistencies in approach. Some companies will not phase out until 2020 and, since this commitment

129 Q65, Q69, Q129, Fauna & Flora International ([EIM0016](#))

130 Fauna & Flora International ([EIM0016](#))

131 As above

132 Q65

133 Fauna & Flora International ([EIM0016](#))

134 Q67

135 Q65

136 Professor Richard Thomson ([EIM0053](#))

137 Q65, Q68, Q87, Q114, Fauna & Flora International ([EIM0016](#))

138 Cornwall Plastic Pollution Coalition ([EIM0054](#))

139 Cornwall Plastic Pollution Coalition ([EIM0054](#))

is voluntary, some companies may not phase out at all. Voluntary action alone will not be adequate to tackle the challenges of microbeads, and believe that a legislative ban would be beneficial in bringing greater consistency in the industry.

Legislative action

46. The US have already issued a legal ban on microbeads in cosmetic products. Through the Microbead-Free Waters Act 2015, the US will ban the manufacture or interstate trade of products containing microplastics.¹⁴⁰ This Act will ban rinse-off cosmetics products containing microbeads from 2018 and the manufacture of these products by 2017.¹⁴¹ According to Johnson & Johnson, there were three critical elements of the US Act that allowed them to support the legislation:

- i) An accurate and appropriately scoped definition of microbeads;
- ii) Implementation dates that allow adequate time (usually around 2-3 years) to complete product reformulation and ensure that consumers have an uninterrupted flow of product; and
- iii) Federal pre-emption to ensure national consistency of approach.¹⁴²

Other countries that are considering bans include Sweden, the Netherlands, New Zealand, Canada, and Kenya.¹⁴³

47. In the EU there is currently no legislation regulating the use and discharge of microplastics in cosmetic and personal care products. Cosmetics Europe and CTPA both argued that existing voluntary commitments were sufficient. The CTPA state:

Given that the phase-out by industry is already underway, we do not think that a ban would have much impact. This being said, the European cosmetics industry does not object in principle since a ban would ensure that any companies who choose not to follow the recommendation would still have to comply with the objective of acting responsibly and removing this source of pollution of the marine environment.¹⁴⁴

The BPF and Plastics Europe agreed. They stated:

In view of the voluntary commitment of the cosmetic industry a ban should not be necessary and it would involve an unnecessary expenditure of taxpayer money that could be put to better use.¹⁴⁵

48. Dr Erik van Sebille, Imperial College, said that an international ban would be much more effective than a national ban on microbeads in tackling the much larger challenge of plastic pollution. However, he argued that a national ban was an important place to start:

¹⁴⁰ Thomas Stanton ([EIM0033](#))

¹⁴¹ Microbeads and microplastics in cosmetic and personal care products, [Briefing Paper Number 7510](#), House of Commons Library, May 2016

¹⁴² Johnson & Johnson ([EIM0042](#))

¹⁴³ Microbeads and microplastics in cosmetic and personal care products, [Briefing Paper Number 7510](#), House of Commons Library, May 2016

¹⁴⁴ The Cosmetic Toiletry & Perfumery Association ([EIM0038](#))

¹⁴⁵ British Plastics Federation ([EIM0041](#))

A microbead ban is about taking action to tackle ocean plastic pollution at source and, in our view, this is the right way to address the problem, making it a good choice of policy. [...] Banning plastics for this use will also demonstrate that the government and other stakeholders in the UK are willing to use policy levers to tackle pollution at source.¹⁴⁶

Daniel Steadman argued that “there is a clear role for the UK Government to play in providing guidance and providing a level playing field” through a legislative ban. Whilst, CHEM Trust, a UK-based charity working to protect humans and wildlife from harmful chemicals, argued:

A UK ban on microbeads would be a start, but EU-wide action would be more effective. The UK government should be pushing the European Commission to propose regulation in this area.¹⁴⁷

Keep Britain Tidy, an environmental charity, also argued that a ban could increase international cooperation:

A number of European countries, Canada and Australia are all considering a legislative route also. If we lead the way we may well influence others to join in and strengthen international action against the microplastics issue.¹⁴⁸

49. In relation to international cooperation, DEFRA said, that they are “supporting other EU Member States in calling for the European Commission to come up with proposals to ban micro-beads in cosmetics and detergents.”¹⁴⁹ George Eustice, Minister at DEFRA, added:

We supported and played quite a key role in getting the OSPAR agreement, the Convention for the Protection of the Marine Environment of the North-East Atlantic, in 2014.¹⁵⁰

50. We heard that the last Government would have considered a unilateral ban on plastic microbeads in shower gels and facial scrubs if the EU did not prohibit their use. The Minister said:

We are working with other European countries to get that on the agenda at European level. But we do not rule out doing it at national level if that falls short or fails to progress.¹⁵¹

One of the mechanisms for action is through the EU Circular Economy Package. George Eustice, Minister at DEFRA, said:

If things go well and it has a fair wind, it is quite possible you could have [a ban through the EU Circular Economy Package] in place next year, during 2017.¹⁵²

146 Q91

147 CHEM Trust ([EIM0010](#))

148 Keep Britain Tidy ([EIM0029](#))

149 DEFRA ([EIM0034](#))

150 Q287 (George Eustice)

151 Q287 (George Eustice)

152 Q372 (George Eustice)

51. The Minister noted that a legislative ban might benefit those companies already taking action:

If the big, responsible companies are saying, “We will voluntarily get rid of these anyway”, frankly it does not matter to them any more if you decide to put in place a ban. If anything, it gives them the reassurance that they will not be placed at a disadvantage from a few companies that might decide not to.¹⁵³

52. **Legislative action would have several advantages for consumers and the industry over the current, voluntary, approach to microbeads. It would be universal, ensuring consumer confidence and preventing responsible companies being undercut. It would ensure consistent definitions were used by all industry participants. It would also send a message that Government was serious about addressing the wider issue of microplastic pollution. In working towards such legislation, the Government should consult widely on implementation to ensure that the main risk - smaller companies being disadvantaged - is mitigated.**

53. *Microbead pollution does not respect national borders. Legislative measures to prevent the sale or manufacture of microbeads will be more effective if undertaken on a transnational basis. The last Government recognised this, and had been working towards EU legislation by the middle of next year. The outcome of the Referendum on EU Membership means that work will now be taken forward by other countries and the new Government, and the UK will have much less influence over it. However, the benefits of cross-border consistency remain.*

54. *We recommend that the Government introduce a legislative ban on the use of plastic microbeads in cosmetics and other toiletries. The legislation should follow the principles set out by Fauna & Flora International around universality and consistency. The Government should ensure consistency with international legislation - particularly with whatever EU measures are introduced - wherever possible, though we regret that this means the UK will have less control over the specific design of the ban.*

Alternatives to microbeads

55. Natural materials including cocoa beans, ground almonds, ground apricot pits, sea salt, ground pumice and oatmeal can be used as alternatives to microbeads in cosmetics products.¹⁵⁴ Professor Galloway argued there are many alternative particles that are organic and are therefore more likely to biodegrade as compared to microbeads.¹⁵⁵ She highlighted:

The majority of microbeads in cosmetics are made out of polyethylene and there have been some estimates from polymer scientists that in a year only 0.1% of polyethylene would be broken down to its constituents [...]. So if you continued to produce polyethylene [...] then you are obviously going to accumulate and accumulate, whereas if you put an organic compound that was going to degrade, you would not have that accumulating effect.¹⁵⁶

153 Q369 (George Eustice)

154 DEFRA ([EIM0034](#)), Neal's Yard Remedies ([EIM0036](#)), Veolia ([EIM0039](#)), L'Oreal ([EIM0043](#)), Yorkshire Water ([EIM0052](#)), Cornwall Plastic Pollution Coalition ([EIM0054](#))

155 Q3

156 As above

Neal's Yard Remedies have never used microbeads in their products and argue that the quality of their products does not suffer because of this.¹⁵⁷ They argue:

There is a plentiful array of highly effective natural sustainable options that have a hugely reduced impact on the environment. These alternatives, such as ground apricot kernels, can provide additional income to suppliers.¹⁵⁸

Furthermore, they highlight that many of their customers are “reassured that they are not contributing to the growing problem of microplastic pollution when using [their] products.”¹⁵⁹

56. Businesses in the cosmetics industry have told us that they are identifying natural alternatives for their products which can meet environmental and health standards.¹⁶⁰ However, the reformulation of alternative ingredients can take time. For example, Johnson & Johnson, said, “[we] have been conducting environmental safety assessments of alternatives [to] ensure that the alternatives we choose are safe and environmentally sound [...]”¹⁶¹ Similarly, L’Oreal noted that alternatives “requires the analysis & identification [...] that can meet many criteria (including human & environmental safety, efficacy, sustainable sourcing of the raw material and overall costs).”¹⁶² Dr Laurent Gilbert, L’Oreal, said:

The standard time to develop a product is between 12 to 18 months, which is the standard timeframe when you have to redo everything regarding the stability of the product, regarding the microbiology protection of the product, compatibility with the packaging.¹⁶³

Businesses have also told us that microbeads will not be switched for biodegradable plastics.¹⁶⁴ Instead, Ian Malcomber, Unilever, told us that they had “reformulated [...] into silica, which is effectively the same as quartz, [a major component of sand and] a mineral that you would find in the environment. [...] The other alternatives we moved into was ground walnut shells and cornmeal in our products.”¹⁶⁵

57. We also heard that businesses were applying sustainable sourcing strategies when seeking alternative ingredients. Dr Laurent Gilbert, L’Oreal, said, “We have a commitment to have all the ingredients from natural origin that we are using sustainably sourced.”¹⁶⁶ Similarly, Ian Malcomber, Unilever, said, “[In] 2010 Unilever produced a Unilever sustainable living plan, which is a set of sustainability commitments across a number of areas. That does include sustainable sourcing.”¹⁶⁷

58. Microbeads have been particularly controversial because of the existence of several viable alternatives which do not have the same environmental impacts. Where those alternatives are natural in origin, companies should ensure they are sustainably

157 Neal's Yard Remedies ([EIM0036](#))

158 Neal's Yard Remedies ([EIM0036](#))

159 As above

160 Q484

161 Johnson & Johnson ([EIM0042](#))

162 L’Oreal ([EIM0043](#))

163 Q448

164 Q461

165 Q420

166 Q484

167 As above

sourced. Where they are artificially produced, they should ensure that appropriate environmental impact assessments are undertaken. The Government should include these conditions in its legislation.

Transitional issues (labelling)

59. The elimination of microbeads in cosmetics has been the central focus of a number of recent campaigns, including *Beat the Microbead*, an international coalition of NGOs working to get companies to remove plastic microbeads from products such as facial scrubs and toothpastes.¹⁶⁸ Two Dutch NGOs, the North Sea Foundation and the Plastic Soup Foundation, launched a smartphone application in 2012 which allows consumers to scan bar codes of cosmetic products to check if they contain microbeads.¹⁶⁹

60. There were disagreements between the NGOs and businesses regarding the voluntary commitments, in particular, the transparency of labelling. For example, the Dove Original Stick Antiperspirant deodorant, a Unilever brand, listed polyethylene in its ingredients.¹⁷⁰ Ian Malcomber, Unilever, argued that this was “polyethylene in its liquid form; in its soluble form”¹⁷¹ which “will be a lot more degradable and will not have the same physical effects [as a solid plastic form].”¹⁷² Dr Masscheleyn, Procter & Gamble, highlighted that the labelling of polyethylene was covered by law:

[Procter and Gamble] follow the regulation, and one of the requirements is to label according to the international nomenclature for cosmetic ingredients. Plastic microbeads are described as polyethylene. The products that contain plastic microbeads have clearly labelled on the back “polyethylene.”¹⁷³

61. Businesses believed it was unnecessary to add microbead labelling as they were already phasing-out microbeads in their products. Dr Masscheleyn, Procter & Gamble, said:

For [Procter & Gamble], which has committed to be out of plastic microbeads and to put in resources to accelerate our plan as much as we can, therefore, I do not see a need to label.¹⁷⁴

Ian Malcomber, Unilever, added:

The labelling of “containing microplastics” does not really apply to [Unilever]. I think we are very public on our website of our commitment to get out of microplastic beads and we have succeeded in that.¹⁷⁵

However, responding to the suggestion that products should clearly state they contained microbeads, Dr Chris Flower, CTPA, said:

[That] would be effectively to post an advert saying, ‘Do not buy my product’.¹⁷⁶

168 Marine Conversation Society ([EIM0025](#))

169 Thomas Stanton ([EIM0033](#))

170 Q409

171 Q413

172 Q414

173 Q410

174 Q406

175 Q407

176 Q405

62. Consumers should be able to tell whether the products they are buying contain microbeads. The industry is failing to label products containing microbeads clearly, and the companies we heard from were reluctant to change their labelling practices. Regulations for labelling are also failing to provide consumers with the clarity they need. In the absence of meaningful action by companies to label their products more clearly, we recommend that the Government introduces a clear labelling scheme for microbeads so that consumers may choose whether they wish to buy products containing microbeads. . The industry told us that transparent labelling of microbeads would amount to an invitation not to buy products with microbeads in. Transparency to date has been provided by initiatives by NGOs. We recognise that this is a transitional issue and that there are costs associated with changing labels. Our preferred outcome would be a national ban on microbeads in cosmetics and toiletries by the end of next year. Failing that, we recommend that the Government introduce a clear labelling scheme for microbeads during the transitional period of a voluntary phase out to provide transparency for customers.

4 Microplastic prevention and solutions

Tackling microplastic pollution

63. Dr van Seville, Imperial College, argued that tackling microplastic pollution is about identifying intervention points, “where it is most efficient to intervene and where it is most efficient to do something about the release.”¹⁷⁷ Professor Thompson said:

Plastics are persistent contaminants; even if it were feasible to cease inputs of plastic debris to the oceans with immediate effect, the quantity of microplastic would continue to increase because of the fragmentation of larger items that are already present in the environment. Hence research is needed to fully understand the abundance, distribution and potential environmental impacts of microplastics. However, it is also important to move toward the solutions which are already widely recognised.¹⁷⁸

The BPF argued, “preventing further plastic from entering the ocean is key to dealing with this issue as removing existing plastics would not prevent future problems and would be expensive.”¹⁷⁹ Similarly, Professor Richard Thompson argued that “the fragmentation of larger items of debris is likely to be a more important source of microplastics than the direct release of microbeads from cosmetics.”¹⁸⁰ He said:

The overarching solution is to ensure greater quantities of plastic waste are captured in recycling streams; this will reduce their potential to become litter (large items of plastic litter become microplastic).¹⁸¹

64. The Marine Conservation Society argued that filtering microplastics from the marine environment would be “extremely challenging, expensive and impractical.” They suggested:

Stopping the microplastics at source is undoubtedly and significantly more efficient than trying to remove it once in the aquatic environment.¹⁸²

Similarly, Fauna & Flora International’s Microplastic Programme has focussed on those sources of microplastic that they deemed easily preventable. They state:

[Although] secondary microplastics may represent a larger source of input than primary microplastic ingredients, we are motivated to work on the latter [...] because we would consider the potential solution to the former (e.g. harmonised waste management reform) to be more vastly longer-term than the latter (changing corporate decision-making).¹⁸³

Neal’s Yard Remedies, argued that “removing plastics from personal care products is the most efficient and cost-effective way of stopping this pollution. ‘End of pipe’ solutions

177 Q40

178 Plymouth University ([EIM0011](#))

179 British Plastics Federation ([EIM0041](#))

180 Q263

181 Plymouth University ([EIM0011](#))

182 Marine Conservation Society ([EIM0025](#))

183 Fauna & Flora International ([EIM0016](#))

through upgrading of sewage treatment plants would be far more costly.”¹⁸⁴ Veolia UK, a wastewater management service agreed that it would be more effective to stop microplastic pollution at the source than through wastewater treatment.¹⁸⁵ This is because the wastewater plants are not equipped to filter out microplastics and equipping the plants with ultrafine filters would be costly. In addition it would not eliminate the problem, as not all waste water passes through a plant.¹⁸⁶

65. The most effective solution to tackling microplastic pollution in the marine environment is to tackle it at the source. This means stemming the flow of primary microplastics, and general plastics, entering the marine environment in the first place. We heard that taking action to tackle ocean plastic pollution at source is the best strategy, and we believe that this is also the most feasible option in the short-term.

Waste and water treatment solution

66. Currently waste water treatment plants are not designed to retain microplastics, and the resulting sewage effluent can carry fibres and microbeads out to rivers, lakes, estuaries and the sea.¹⁸⁷ A Eunomia report for the European Commission found that the percentage of microplastic particles captured in waste water treatment sewage sludge ranges from 65% to 100%.¹⁸⁸ The British Plastics Federation said:

All countries in the world need to have adequate waste management facilities to deal with the waste they are producing and ensure it is used to its maximum value. Ensuring education on litter takes place globally will also be essential.¹⁸⁹

67. Surface water treatment processes generally have three stages of treatment which includes coagulation, flocculation and filtration. These processes do not specifically monitor for microplastics, however, they may coincidentally capture extremely small particles.¹⁹⁰ United Utilities stated that, for drinking water, particles over 0.5µm were filtered out through this process so microplastics above this size will not enter drinking water.¹⁹¹ Following these processes, wastewater and sludges from the water treatment plant are treated and then the waste streams are subsequently discharged to sewer, local water course or the sludge is thickened and spread on land or sent to sewer.¹⁹²

68. In relation to sewage sludge containing microplastics washing back into the river, Severn Trent Water highlighted:

100% of the sludge bioproduct generated by Severn Trent Water is safely recycled to land. Whilst there are no specific measures targeted at preventing microplastics in sludge from washing back into rivers, there is an industry

184 Neal’s Yard Remedies ([EIM0036](#))

185 Veolia ([EIM0039](#))

186 As above

187 Veolia ([EIM0039](#)), United Utilities ([EIM0047](#)), Northumbrian Water ([EIM0049](#)), Thames Water ([EIM0051](#)), Yorkshire Water ([EIM0052](#)), Water UK ([EIM0055](#))

188 DEFRA ([EIM0034](#))

189 British Plastics Federation ([EIM0041](#))

190 Water UK ([EIM0055](#))

191 United Utilities ([EIM0047](#))

192 Plastic Oceans ([EIM0021](#)), Water UK ([EIM0055](#))

wide code of practice [the DEFRA published Code of Practice for Agricultural Use of Sewage Sludge] in place that covers the recycling of bioproduct to land. This code covers protection of the aquatic environment.¹⁹³

Dr van Sebille, Imperial College London, identified a study of water treatment plants in the Chicago area, and suggested sand filters may be effective in capturing both fibres and microbeads.¹⁹⁴ Thomas Maes, CEFAS, did a study on the sewage treatment works in Crossness which looked at the incoming water, the outgoing water and the sediments in front of the pipe to ascertain the amount of microplastics and it found an “almost 85% reduction [in microplastics].”¹⁹⁵ However, Dr van Sebille added:

A sand filter might work very well, but the problem is once you go into that, at some point you have to backflush your sand filter, you have to push it back, and then what do you do with that sludge?¹⁹⁶

Sludge was also a concern from Anglian Water, which stated that:

This sludge forms a vital biosolid product that is recycled to agricultural land. Increased concentrations of plastics in this product would not just return the plastics back to the environment through spreading, but could also raise concerns about quality of the biosolid product and therefore put at risk a valuable source of nutrients for the agricultural sector.¹⁹⁷

69. We received evidence from water companies that there are no specifically designed sewage treatment processes to capture very small particles.¹⁹⁸ Many plants, such as Southern Water, have methods of capturing plastics above 6mm, which will not be able to further degrade into microplastics.¹⁹⁹ There are also limits set relating to treatment processes for other organic and inorganic solids.²⁰⁰

70. Furthermore, all water companies highlighted that there is currently no agreed methodology for taking plastic pollution measurements. South West Water said, “We do not measure plastic content in our sewage treatment works influent or in treated effluent, and are not currently required by any regulations to do so.”²⁰¹ Yorkshire water reiterated this and said “Currently our sewerage systems and treatment processes are not designed to remove microplastics and we are not regulated by the Environment Agency to do so.”²⁰² This was reaffirmed by Dr Foster, Marine Conservation Society, who said, “When I talked to the Environment Agency they do not monitor [microplastics]. There are no permissions required. You can effectively emit as much pellets as you like legally as far as I understand from the Environment Agency, because it is not considered a hazardous substance.”²⁰³ We wrote to The Environment Agency who stated that they:

193 Severn Trent Water ([EIM0045](#))

194 Q16

195 Q332

196 Q16

197 Anglian Water ([EIM0046](#))

198 Veolia ([EIM0039](#)), Wessex Water ([EIM0044](#)), United Utilities ([EIM0047](#)), Northumbrian Water ([EIM0049](#)), Thames Water ([EIM0051](#)), Yorkshire Water ([EIM0052](#)), Water UK ([EIM0055](#))

199 Southern Water ([EIM0048](#))

200 As above

201 South West Water ([EIM0050](#))

202 Yorkshire Water ([EIM0052](#))

203 Q97

[Do] not currently explicitly consider micro-plastic in its environmental permits to discharge liquid effluent or waste water to surface water or onto the ground. [...] Regulation at end of pipe would be premature before there is a better understanding of sources and environmental impacts of microplastics and the costs and benefits of supply-side or end-of-pipe controls. There is a need for better information on the source apportionment of microplastics in the environment and potential effectiveness of control measures.²⁰⁴

71. Water UK said, “the water industry has no current experience or technologies to separate out microplastics [...] and treatment of micro plastics by the water industry has never been explored.”²⁰⁵ They argued that a key challenge is to separate the microplastics from the organic content on available operational scale and at reasonable cost. There are significant investment needs to add any additional filtration to pump effluent or sludges against a series of fine mesh.

72. Similarly, the Government argues that installing filtration systems will be an expensive option. George Eustice, Minister at DEFRA, said:

Filtration goes through various phases and filters out more and more of the plastics. Frankly, it is incredibly difficult and a big undertaking to filter microbeads out, because you need quite expensive sand filtration systems. It is therefore probably easier to try to stop putting them in the sewer in the first place, rather than putting them in and trying to work out how to take them out.²⁰⁶

However, the Government told us that they had not been in contact with any water companies but were open to the suggestion. George Eustice, Minister at DEFRA, said:

We have not [called a summit of water companies]. [...] We will want to digest this evidence digest and take it on board to see whether lessons can be learned. If there are issues that we should build into the pricing plans that Ofwat is looking at in the future, we can do that, if it can be done in a cost-effective way.²⁰⁷

73. We heard that prevention at source by reducing the number of microplastics flushed into the oceans is most viable. However, there are also opportunities to capture microplastics through effective waste and water sewage treatment processes which currently do not require the monitoring of microplastics. We recognise the heavy investment needed in this area, and that there is difficulty in filtering microplastics. Therefore, we recommend that the Government and Environment Agency work with Water Companies to understand what feasible options there are to monitor and ultimately reduce microplastic pollution.

204 Environment Agency ([EIM0056](#))

205 Water UK ([EIM0055](#))

206 Q327

207 Q340

Conclusions and recommendations

Microplastic Pollution

1. There is significant public concern around microbeads, however, they make up a small proportion of total microplastic pollution. The wider issue of microplastic pollution cannot be set aside once microbeads have been dealt with. We recognise the research is still relatively new and subject to uncertainties. We recommend that the Government work towards a systematic strategy for researching and mitigating sources of microplastic pollution. We suggest that synthetic fibres and tyres are two sources that should be examined at an early stage. (Paragraph 13)
2. The impacts on the marine environment are still being researched. However, there is evidence that there is scope for significant harm to the marine environment. Microplastic pollution is potentially more environmentally damaging than larger pieces of plastic because small pieces of plastic are more likely to be eaten by wildlife and have a greater surface area which can transfer chemicals to and from the marine environment. (Paragraph 20)
3. *There is little evidence on potential human health impacts of microplastic pollution. What evidence there is suggests that dietary exposure is likely to be low. Further research in this area is underway and is clearly required. The Government should set out a timescale within which it will publish an assessment of the potential health impacts and any measures it intends as a response.* (Paragraph 26)
4. The Committee heard that studies estimating the economic costs of microplastic pollution vary widely. As with the health impacts, the Government should set out a timescale in which it intends to produce a more accurate assessment. It should also ensure that microplastics are treated as an economic issue – within the scope of its food and farming strategy - as well as an environmental one. (Paragraph 29)
5. It is important to address microplastic pollution as a transnational problem and to understand that plastic in the ocean is in constant motion. The Government should continue international cooperation despite uncertainties arising from the EU referendum. It is clear that international action is needed. We recommend the Government maintain existing cooperation with international partners in tackling microplastic pollution. Up to now, NGOs have taken the lead role in addressing this issue. However, this is unsustainable given the increasing costs and demands relating to microplastic pollution. As more evidence emerges about the impact of microplastic pollution, the Government must take on that role. (Paragraph 33)

Microbeads

6. Experts have estimated that around 680 tonnes of plastic microbeads are used in the UK every year. A single shower can result in 100,000 plastic particles entering the sewage system. Microplastics from cosmetic products are believed to make up 0.01% to 4.1% of the total microplastics entering the marine environment. The fact that

this accounts for a small percentage of total microplastic pollution in the sea does not stop it being a significant and avoidable environmental problem, and possibly a low-hanging fruit in the context of tackling wider plastic pollution. (Paragraph 39)

7. We welcome the commitment by a section of the cosmetics industry to phase out microbeads. However, the commitment is not universal, and there are inconsistencies in approach. Some companies will not phase out until 2020 and, since this commitment is voluntary, some companies may not phase out at all. Voluntary action alone will not be adequate to tackle the challenges of microbeads, and believe that a legislative ban would be beneficial in bringing greater consistency in the industry. (Paragraph 45)
8. Legislative action would have several advantages for consumers and the industry over the current, voluntary, approach to microbeads. It would be universal, ensuring consumer confidence and preventing responsible companies being undercut. It would ensure consistent definitions were used by all industry participants. It would also send a message that Government was serious about addressing the wider issue of microplastic pollution. In working towards such legislation, the Government should consult widely on implementation to ensure that the main risk - smaller companies being disadvantaged - is mitigated. (Paragraph 52)
9. *Microbead pollution does not respect national borders. Legislative measures to prevent the sale or manufacture of microbeads will be more effective if undertaken on a transnational basis. The last Government recognised this, and had been working towards EU legislation by the middle of next year. The outcome of the Referendum on EU Membership means that work will now be taken forward by other countries and the new Government, and the UK will have much less influence over it. However, the benefits of cross-border consistency remain.* (Paragraph 53)
10. *We recommend that the Government introduce a legislative ban on the use of plastic microbeads in cosmetics and other toiletries. The legislation should follow the principles set out by Fauna & Flora International around universality and consistency. The Government should ensure consistency with international legislation – particularly with whatever EU measures are introduced – wherever possible, though we regret that this means the UK will have less control over the specific design of the ban.* (Paragraph 54)
11. Microbeads have been particularly controversial because of the existence of several viable alternatives which do not have the same environmental impacts. Where those alternatives are natural in origin, companies should ensure they are sustainably sourced. Where they are artificially produced, they should ensure that appropriate environmental impact assessments are undertaken. The Government should include these conditions in its legislation. (Paragraph 58)
12. Consumers should be able to tell whether the products they are buying contain microbeads. The industry is failing to label products containing microbeads clearly, and the companies we heard from were reluctant to change their labelling practices. Regulations for labelling are also failing to provide consumers with the clarity they need. In the absence of meaningful action by companies to label their products more clearly, we recommend that the Government introduces a clear labelling

scheme for microbeads so that consumers may choose whether they wish to buy products containing microbeads. The industry told us that transparent labelling of microbeads would amount to an invitation not to buy products with microbeads in. Transparency to date has been provided by initiatives by NGOs. We recognise that this is a transitional issue and that there are costs associated with changing labels. Our preferred outcome would be a national ban on microbeads in cosmetics and toiletries by the end of next year. Failing that, we recommend that the Government introduce a clear labelling scheme for microbeads during the transitional period of a voluntary phase out to provide transparency for customers. (Paragraph 62)

Microplastic prevention and solutions

13. The most effective solution to tackling microplastic pollution in the marine environment is to tackle it at the source. This means stemming the flow of primary microplastics, and general plastics, entering the marine environment in the first place. We heard that taking action to tackle ocean plastic pollution at source is the best strategy, and we believe that this is also the most feasible option in the short-term. (Paragraph 65)
14. We heard that prevention at source by reducing the number of microplastics flushed into the oceans is most viable. However, there are also opportunities to capture microplastics through effective waste and water sewage treatment processes which currently do not require the monitoring of microplastics. We recognise the heavy investment needed in this area, and that there is difficulty in filtering microplastics. Therefore, we recommend that the Government and Environment Agency work with Water Companies to understand what feasible options there are to monitor and ultimately reduce microplastic pollution. (Paragraph 73)

Formal Minutes

Wednesday 20 July 2016

Members present.

Mary Creagh, in the Chair:

Geraint Davies Kerry McCarthy
Caroline Lucas

Draft Report (*Environmental Impact of Microplastics*), proposed by the Chair, brought up and read.

Paragraphs 1 to 73 read and agreed to.

Summary read and agreed to.

Resolved, That the Report be the Fourth Report of the Committee to the House.

Ordered, That the Chair make the Report to the House.

Ordered, That embargoed copies of the Report be made available, in accordance with the provisions of Standing Order No. 134.

[The Committee adjourned]

Witnesses

The following witnesses gave evidence. Transcripts can be viewed on the [inquiry publications page](#) of the Committee's website.

Monday 9 May 2016

Question number

Professor Tamara Galloway, Professor of Ecotoxicology, University of Exeter, **Dr Erik van Sebille**, Faculty of Natural Sciences, the Grantham Institute for Climate Change, Imperial College, and **Professor Frank Kelly**, Professor of Environmental Health, King's College London

[Q1–64](#)

Tuesday 24 May 2016

Francisco Morcillo, Public & Industrial Affairs Manager, British Plastics Federation, **Dr Laura Foster**, Head of Pollution, Marine Conservation Society, **Sarah Baulch**, Oceans Campaigner, Environmental Investigation Agency, and **Daniel Steadman**, Marine Plastics Projects Manager, Fauna & Flora International

[Q65–164](#)

Wednesday 8 June 2016

John Chave, Director General, Cosmetics Europe, and **Dr Chris Flower**, Director General, The Cosmetics, Toiletry and Perfumery Association

[Q165–262](#)

Professor Richard Thompson, Professor of Marine Biology, Plymouth University

[Q263–286](#)

Tuesday 14 June 2016

George Eustice MP, Minister of State for Farming, Food and the Marine Environment, DEFRA, **Dr Gemma Harper**, Deputy Director for Marine and Chief Social Scientist, DEFRA, and **Thomas Maes**, National & International Monitoring Programmes Co-ordinator, Centre for Environment Fisheries and Aquaculture Science

[Q287–400](#)

Wednesday 29 June 2016

Dr Laurent Gilbert, Director for International Development of Advanced Research at L'Oréal, **Ian Malcomber**, Science Director at Unilever, and **Dr Patrick Masscheleyn**, Director R&D Beauty Care and Global Product Stewardship, Procter & Gamble

[Q401–511](#)

Published written evidence

The following written evidence was received and can be viewed on the [inquiry publications page](#) of the Committee's website.

EIM numbers are generated by the evidence processing system and so may not be complete.

- 1 5 Gyres Institute ([EIM0017](#))
- 2 Anglian Water ([EIM0046](#))
- 3 British Plastics Federation ([EIM0041](#))
- 4 British Plastics Federation / PlasticsEurope ([EIM0015](#))
- 5 British Retail Consortium ([EIM0037](#))
- 6 Brunel University, London ([EIM0028](#))
- 7 CEFAS ([EIM0023](#))
- 8 CHEM Trust ([EIM0010](#))
- 9 Cornwall Plastic Pollution Coalition ([EIM0054](#))
- 10 Cosmetics Europe ([EIM0032](#))
- 11 DEFRA ([EIM0034](#))
- 12 Dr Dannielle Green ([EIM0040](#))
- 13 Dr Michael Shaver ([EIM0005](#))
- 14 Dr Natalie Welden ([EIM0003](#))
- 15 Environment Agency ([EIM0056](#))
- 16 Environmental Investigation Agency (EIA) ([EIM0022](#))
- 17 Fauna & Flora International ([EIM0016](#))
- 18 Fidra ([EIM0012](#))
- 19 Grantham Institute ([EIM0027](#))
- 20 Greenpeace UK, the Environmental Investigation Agency, Fauna & Flora International, and the Marine Conservation Society ([EIM0020](#))
- 21 Johnson & Johnson ([EIM0042](#))
- 22 Keep Britain Tidy ([EIM0029](#))
- 23 King's College London ([EIM0014](#))
- 24 L'Oréal ([EIM0043](#))
- 25 Marine Conservation Society ([EIM0025](#))
- 26 Mr Shay Fennelly ([EIM0004](#))
- 27 Neal's Yard Remedies ([EIM0036](#))
- 28 Northumbrian Water ([EIM0049](#))
- 29 Novamont ([EIM0035](#))
- 30 Plastic Oceans ([EIM0021](#))
- 31 Plymouth Marine Laboratory ([EIM0008](#))
- 32 Plymouth University ([EIM0011](#))
- 33 Professor Richard Thompson ([EIM0053](#))

- 34 Rame Peninsula Beach Care ([EIM0007](#))
- 35 Richard Shirres ([EIM0031](#))
- 36 Royal Society of Chemistry ([EIM0019](#))
- 37 Severn Trent Water ([EIM0045](#))
- 38 South West Water ([EIM0050](#))
- 39 Southern Water ([EIM0048](#))
- 40 Thames Water ([EIM0051](#))
- 41 The Cosmetic Toiletry & Perfumery Association ([EIM0038](#))
- 42 Thomas Stanton ([EIM0033](#))
- 43 United Utilities ([EIM0047](#))
- 44 University of Exeter ([EIM0009](#))
- 45 Veolia ([EIM0039](#))
- 46 Water UK ([EIM0055](#))
- 47 Wessex Water ([EIM0044](#))
- 48 World Animal Protection UK ([EIM0013](#))
- 49 Yorkshire Water ([EIM0052](#))

List of Reports from the Committee during the current Parliament

All publications from the Committee are available on the [publications page](#) of the Committee's website.

The reference number of the Government's response to each Report is printed in brackets after the HC printing number.

Session 2015–16

First Report	The Airports Commission Report: Carbon Emissions, Air Quality and Noise	HC 389
Second Report	The Future of the Green Investment Bank	HC 536
Third Report	EU and UK Environmental Policy	HC 537
First Special Report	Local Nature Partnerships: Government Response to the Committee's Twelfth Report of Session 2014–15	HC 377
Second Special Report	Climate change adaptation: Government Response to the Committee's Tenth Report of Session 2014–15	HC 590

Session 2016–17

First Report	Soil health	HC 180
Second Report	Flooding: Cooperation across Government	HC 183