

REMOVING OR RESTRICTING MICROPLASTIC INGREDIENTS OR “MICROBEADS” FROM CONSUMER AND INDUSTRIAL PRODUCTS

FFI GUIDANCE ON IMPROVING CORPORATE INGREDIENT POLICIES
AND/OR REGULATORY MEASURES TO EFFECTIVELY PREVENT
SOURCES OF MICROPLASTIC POLLUTION

VERSION 1, PUBLISHED 30 JANUARY 2017

ABOUT FAUNA & FLORA INTERNATIONAL

Fauna & Flora International (FFI), the world's oldest international biodiversity conservation organisation, is a proven conservation innovator that continues to make a lasting impact on global biodiversity – the variety of life on Earth.

FFI's work spans across the globe, with over 140 projects in over 40 countries, mostly in the developing world. We proudly stand up for biodiversity and aim to show just how relevant it is to all of those who share the planet.

- **LEADERSHIP:** We've been working for more than a century in innovative, sustainable conservation, developing models that inspire others.
- **DIVERSITY:** Our focus is biodiversity: to secure a healthy future for our planet where people, wildlife and wild places coexist.
- **VALUE:** Our lean, entrepreneurial structure and style allow us to engage quickly and effectively on critical environmental issues.
- **COLLABORATION:** Lasting local partnerships have been at the heart of our conservation activities for more than one hundred years.

OUR VISION

A sustainable future for the planet, where biodiversity is effectively conserved by the people who live closest to it, supported by the global community.

OUR MISSION

To act to conserve threatened species and ecosystems worldwide, choosing solutions that are sustainable, based on sound science and take into account human needs.

LIST OF ACRONYMS

ASTM	American Society for Testing and Materials Standards (International)
BPF	British Plastic Federation
BtMB	Beat the Micro Bead Campaign
°C	Degrees Celcius
DEFRA	Department for the Environment, Fisheries & Rural Affairs
EAC	Environmental Audit Committee
ECHA	European Chemicals Agency
EIA	Environmental Investigation Agency
EU	European Union
FFI	Fauna & Flora International
FTIR	Fourier Transform Infrared Spectroscopy
GHS	Globally Harmonized System of Classification and Labelling of Chemicals
HDPE	High-Density Polyethylene
INCI	International Nomenclature of Cosmetic Ingredients
ISO	International Organization for Standardization
KEBS	Kenyan Bureau of Standards
<	Less than
≤	Less than or equal to
MCS	Marine Conservation Society, UK
MLAN	Marine Litter Action Network
mg/L	Milligrams per litre
µm	Micrometer
mm	Millimeter
MP	Microplastic
MPIs	Microplastic Ingredients
MSFD	Marine Strategy Framework Directive
NB	Nota Bene (take special notice)
nm	Nanometer
NGOs	Non-Governmental Organisations
NSF	Stichting de Noordzee (North Sea Foundation)
PBTs	Persistent, Bioaccumulating Toxins
PCCPs	Personal Care and Cosmetic Products

PE	Polyethylene
PET	Polyethylene Terephthalate
PMMA	Polymethyl Methacrylate
PS	Polystyrene
PSF	Plastic Soup Foundation
PTFE	Polytetrafluoroethylene
PVC	Polyvinyl Chloride
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
T	Temperature
UK	United Kingdom
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Program
UPVC	Unplasticised Polyvinylchloride
US	United States
USA	United States of America

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1. EXECUTIVE SUMMARY

Microplastic ingredients (MPs), commonly referred to as plastic microbeads¹, are pieces of plastic up to 5mm in diameter (a microplastic (MP)) which are commonly used as ingredients in a variety of consumer and industrial products including, but not limited to, personal care and cosmetic products (PCCPs) and cleaning products. They are a proven direct source of marine microplastic pollution and are a problem because:

- All types of MPs, including PCCPs, are known to pass through wastewater sewage treatment^{2,3,4,5} and enter waterways and oceans at rates of up to 550 million per day in the UK^{6,7}.
- In marine and freshwater environments, MPs can persist for hundreds of years⁸ and, due to their small size, they are often mistaken for food by a wide range of animals, including over 50 marine species⁹; MPs specifically have also been found in the digestive tracts of fish in coastal environments¹⁰.
- Impacts of MPs on biodiversity have been demonstrated by peer-reviewed research and include mortality, internal injuries, starvation, reduced growth and sub-optimal feeding/breeding behaviour in marine and freshwater species. MPs are known to persist in organisms' digestive systems; release and adsorb persistent, bioaccumulating and toxic (PBTs) contaminants in the environment; act as a vector, transferring contaminants to those organisms that ingest them, as well as causing bioaccumulation in higher trophic levels (see Appendix 1).¹¹

In order to solve this problem, the sectors responsible for PCCPs have made various voluntary commitments, in various global markets, to audit their use of MPs and remove

them where identified as an environmental risk. This process has not been standardised and significant differences of definition and scope exist among voluntary commitments globally.

Policymakers have also made strides to respond to the problem of corporate use of MPs; the US government introduced the first national ban on products containing specific types of MPs through the Microbead-Free Waters Act of 2015¹². In September 2016, the UK Government also announced plans to introduce a national "ban on the sale and manufacture of cosmetics and personal care products containing tiny pieces of plastic, commonly known as 'microbeads'"¹³, which could cover a much wider range of products than the US ban and has the potential to be the most progressive piece of legislation tackling a direct source of MP pollution in the world.

The following briefing note has been prepared by Fauna & Flora International (FFI), a UK-based non-governmental conservation organisation that acts to conserve threatened species and ecosystems worldwide, choosing solutions that are sustainable, based on sound science and take into account human needs. We have been working on tackling preventable and unnecessary sources of marine microplastic pollution since 2011 in response to the growing scientific evidence of the potential biodiversity impacts around small pieces of plastic that can be directly taken up by organisms. The purpose of this guidance is to outline the principles and recommendations developed by FFI regarding effective measures to end MPI use that contributes to marine plastic pollution; these principles apply to companies designing voluntary commitments related to MPI use as well as policymakers seeking to ban the sale and manufacture of products containing MPs.

We ask that the following principles are considered by any company, brand, product formulator or ingredient manufacturer that wants to reduce the accumulation of marine plastic litter by phasing out microplastic ingredients from their products.

These principles state that a corporate commitment to remove microplastic ingredient should include:

1. Restriction of all microplastic ingredients
2. Application to all 'down the drain' products
3. No exemption for non-marine-tested synthetic solid ingredients
4. No exemption for plastic ingredients below a certain size
5. Implementation within an ambitious timeframe
6. Application to all brands in a company's portfolio
7. Application to all future formulations of products

We also ask that these same principles are considered by any regional, national or international policymaker that wants to reduce the accumulation of marine plastic litter by banning the sale, manufacture or import of microplastic ingredients (and/or products containing them).

2. INTRODUCTION

Plastic pollution in the world's oceans is ubiquitous. Globally, 300 million tonnes of plastic are produced annually, in a trillion dollar industry that employs over 180,000 people in the UK alone¹⁴. Virtually every aspect of life is now reliant upon plastic and consequentially, it is estimated that up to 12 million tonnes of plastic waste enters our oceans and waterways annually¹⁵.

Marine litter is defined as 'items that have been deliberately discarded, unintentionally lost, or transported by wind and rivers, into the sea and on beaches¹⁶. Over 80% of marine litter is thought to originate from the land and up to 80% of this litter is composed of (macro) plastic waste (large, visible pieces of debris polluting waterways¹⁷). The socio-economic, ecological and environmental impact of visible macroplastic pollution has been manifest for many years and a large number of interventions have been launched accordingly, including but not limited to national & regional recycling schemes, clean-up operations, plastic bag levies and education campaigns. It is over the course of the last decade that the emergent topic of microplastic pollution has gained global notoriety.

'Microplastics' were reputedly first described by Thompson et al. in 2004¹⁸; this led to a definition by scientists in the USA, who used the term to refer to 'plastic particles measuring less than 5mm in diameter'¹⁹. It is important to note that this definition does not include a lower size limit for microplastic particles and particles as small as 1µm have been recorded in water samples. Today, the body of supporting scientific evidence highlighting the seriousness of the impact of microplastic pollution on biodiversity (see Appendix 1), habitat degradation, and associated socio-economics has grown exponentially – a small sub-set of which is referenced throughout this

document. In short, compelling evidence confirms both physical and toxicological effects that microplastic pollution has on marine biota. Many of the known toxins associated with microplastic pollution are passed along the food chain. Reports have even emerged confirming that water samples collected from across the globe are found to be contaminated with microplastic particles^{20,21,22,23}. With regard to commercial fisheries, the proven impacts of microplastic pollution could have potentially grave economic repercussions and raise a number of questions highlighting implications for human health which are now being investigated more closely.²⁴

Microplastic pollution is no longer a subject of scientific debate – the seriousness of the issue is very much at the forefront of the minds of the public²⁵, the scientific community²⁶, businesses (see Appendix 5), non-governmental organisations²⁷, national policymakers²⁴ and intergovernmental organisations²⁸ alike.

An internal FFI horizon scanning exercise in 2011 revealed that despite the seriousness of microplastic pollution - particularly in terms of biodiversity impact - there was limited activity underway in the UK tackling direct sources of microplastic pollution. FFI recognised the need for timely intervention in the UK and in 2012, launched its targeted marine plastics program. Drawing on core strengths held across the organisation, including a strong operational reputation with corporates and effective working relationships with other international NGOs working on similar issues, FFI set out to work collaboratively and constructively to improve corporate policies and practice to prevent avoidable, direct sources of microplastic pollution from entering the marine environment.

3. THE GOOD SCRUB GUIDE INITIATIVE

With the growing body of scientific literature covering the sources and impacts of microplastic pollution, an important distinction was made about *types* of microplastics²⁶:

- *Primary microplastics* – purposefully designed and manufactured to function at sizes \leq 5mm
- *Secondary microplastics* – fragments \leq 5mm formed by the breakdown of larger pieces of plastic

This distinction was important to FFI because it saw that in the case of primary microplastics, there was likely to be a solution to the problem: where microplastic use was purposeful, originating from a clear source and lost to the environment (accidentally or consequentially), a change in practice would likely eliminate this source of microplastic pollution.

Microplastic particles (often used as abrasives) – or microbeads as they are now known – in cosmetic²⁹ and personal care products such as facial exfoliators, body scrubs, and toothpastes were widely cited as an example of primary microplastic use¹⁷. For example, early patents promoting the use of ‘pulverised Polyethylene’ in facial powders or ‘plastic synthetic resin materials’ and ‘plastic scrubber particles’ made of polyethylene, polypropylene or polystyrene in exfoliating products date back to the 1960s³⁰ and 1970s³¹ respectively. These microbeads, as they have come to be known, are (essentially) purpose-designed to wash down the drain and invariably enter the marine environment because the particles are too small (often \leq 1mm) to be retained during wastewater treatment processes³².

An early market research exercise conducted by FFI highlighted the widespread commercial use of non-plastic, natural abrasive alternatives which reaffirmed the notion that this was an avoidable source of marine microplastic pollution. As such, FFI launched its [Good Scrub Guide](#) as a tool with which to influence change in corporate behaviour relating to the use (and associated reputational risks) of microplastics in personal care products.

To support this work, FFI created a product database which has evolved over time to assess the ingredients of some 1,500 Personal Care and Cosmetic Products (PCCPs). In 2012, FFI partnered with Dutch organisations Plastic Soup Foundation (PSF) and Stichting de Noordzee (North Sea Foundation, NSF) to launch the internationally focused Beat the Micro Bead (BtMB) website and smartphone App at the United Nations Environment Program (UNEP) second Global Land-Ocean Connections meeting in Jamaica in 2013. Together, the organisations behind the BtMB campaign started to approach some of the world’s most prominent multinational corporations about their use of microplastic ingredients (MPIs), encouraging a timely phase out in each instance. This work encouraged multinational corporations to make public commitments very early on that confirmed their intent to remove particular MPIs from at least part of their product range.

These announcements being made on an international stage created an opportunity for brands and retailers operating or headquartered in the UK to follow a shifting market trend. Working closely with the Marine Conservation Society UK (MCS), FFI approached a range of companies to:

- Confirm the absence of MPIs in products marketed by identified ‘green’ brands
- Encourage the timely phase out of identified MPIs across all product ranges where relevant
- Seek further information and clarification about the use of suspected MPIs in certain products

In each case, FFI worked constructively with UK businesses to craft and publish public statements confirming action and corporate positions relating to MPI use (see Appendix 5). In addition to our work with corporate businesses, FFI & MCS launched a public outreach pledge page – [Scrub it Out!](#) – within the context of MCS’ Marine Litter Action Network (MLAN) in order to gauge the British public’s response to the MPI issue.

Following the 2015 announcement of the United States (US) Federal government Microbead-free Waters Act¹², Greenpeace UK launched a petition²⁵ in the UK encouraging then Prime Minister David Cameron to follow the lead of then President Barack Obama. This campaign was phenomenally successful, securing over 350,000 signatures from the

British public in the first month alone and culminated in the formation of a UK microbead coalition – a collaborative partnership between FFI, Environmental Investigation Agency (EIA), Greenpeace UK and MCS – calling for the UK government to impose an effective legislative ban in the UK on the use of all MPIs in all PCCPs and cleaning products that go down the drain.

4. KEY LEARNINGS & OUTCOMES FROM THE GOOD SCRUB GUIDE INITIATIVE

4.1 Voluntary corporate commitments relating to MPI use

Our work in this area has been informed and reinforced by careful and thorough review of published ingredient lists of a wide range of PCCPs and cleaning products³³ (see Appendix 3 for summarised product data) and tracking/leveraging corporate phase-out commitments nationally and internationally³⁴ (see Appendix 5 for list of leveraged corporate commitments). FFI has kept informed of all emerging scientific literature on the subject, tracked and reviewed proposed and enacted microbead legislation from around the world (see discussion in section 5 below) and maintained active participation in relevant multi-stakeholder working groups at home and abroad on this subject.

By reviewing published PCCP ingredient lists, the complexities of this subject became very clear. Plastics are generally defined as synthetic organic polymers¹⁷ but it is important to note that in the context of microplastic pollution and marine litter, not all synthetic ingredients can be considered MPIs. In a published review of MPI use in PCCPs, it was reported that the plastic ingredients of interest share the following properties with microplastic litter³⁵:

- Solid phase materials (i.e. solid particulates, not liquids)
- Insoluble in water
- Synthetic
- Non degradable (e.g. according to standardized tests)
- Made from plastic
- Small size (up to 5 mm, although they can be even smaller than 1 µm, i.e. nano-sized)

The key published definitions of MPIs that are relevant to microplastic litter arising from MPI use in PCCPs and cleaning products are summarised in Appendix 2.

Furthermore, it is evident that the molecular make-up of any given plastic polymer has a significant bearing on the final physical state and properties of the ingredient. For example, a given polymer, with differing molecular weights can manifest in several different phases (i.e. liquid, wax, semi-solid and solid matter) but can retain the same technical/chemical name and/or International Nomenclature of Cosmetic Ingredients (INCI) number^{35,36,37}. FFI has carefully applied this technical knowledge during its review of UK PCCPs and, where uncertainties have arisen, FFI has sought clarification and further information from some of the producers and formulators of PCCPs in question. FFI maintains an evolving document of unverified polymeric ingredients of concern (see Appendix 4 for full details), which could be MPIs in some product formulations, and continues to discuss these ingredients with product formulators and during conversations with corporates to ensure that in the preparation of voluntary commitments, the status (i.e. physical state) of these unverified polymeric ingredients of concern is reviewed and confirmed and to ensure that all voluntary commitments are as inclusive as possible, including *all* solid, particulate water-insoluble MPIs.

It should be noted that although the use of MPIs in PCCPs was the initial focus of the Good

Scrub Guide initiative, it is known that MPIs are used in a wider range of consumer and industrial products including but not limited to domestic and commercial cleaning products³⁷. Legislation governing the publication of ingredients on PCCPs is far more stringent than that of domestic & commercial cleaning products and as such, a review of MPIs in these products has been more challenging. That said, FFI has worked with its partner organisations in the UK microbead coalition to test a selection of such products in a laboratory using Fourier transform infrared spectroscopy (FTIR) to check for the presence of MPIs. Results of this testing have not been conclusive as of January 2017.

During the period 2015-2016, FFI's work with MCS resulted in significant traction with UK businesses – helping generate progressive public commitments from bespoke companies, leading high street brands, major retailers and also multinational corporations (see Appendix 5)³⁴. During the same time period, this process was amplified in an international context during FFI's and MCS' involvement in the global BtMB campaign, which also used to celebrate a large number of positive commitments made by national and international companies to voluntarily remove MPIs.

Summary of FFI's key findings between 2012 and 2016 resulted in:

- Identification of six known MPIs commonly used in solid, water-insoluble form – polyethylene (PE)^{38,39,40,41}, polypropylene (PP)^{42,43}, polyethylene terephthalate (PET)^{44,45}, polytetrafluoroethylene (PTFE)⁴⁶, polymethyl methacrylate (PMMA)⁴⁷ and nylon^{48,49}
- Identification of over 110 unverified polymeric ingredients of concern that could be solid, water-insoluble MPIs in some product formulations^{35,36,37} (see full list in Appendix 4)
- A systematic review of over 1,500 PCCPs in the UK, across more than 20 product categories, for the presence of known MPIs commonly used in solid, water insoluble form and of unverified polymeric ingredients of concern (see Appendices 3 and 4)
- Recording known, commonly used MPIs in a wide range of sampled PCCPs across over 10 product categories (see Appendix 3)
- Highlighting unverified polymeric ingredients of concern (see Appendix 4) in a wide range of sampled PCCPs across over 10 product types (see Appendices 3 and 4)
- Conducting an evaluation of 58 products in the last four months of 2016 to see whether or not there was any change in the ingredient lists of these products which were previously recorded during the period 2012-2015 as containing known MPIs (see Appendix 3 for more details). We found that:
 - 28 products (or 48.3%) across three product types (body scrubs, deodorants and face scrubs) still contained known MPIs in September-December 2016
 - 16 products (or 27.6%) across four product types (body scrubs, deodorants, face scrubs and soaps) no longer contained known MPIs but contained unverified polymeric ingredients of concern in September-December 2016
 - 14 products (or 24.1%) across four product types (body scrubs, deodorants and face scrubs) no longer contained any known MPIs or unverified polymeric ingredients of concern in September-December 2016
- Conducting a preliminary review, with the help of Greenpeace UK, of more than 50 cleaning products, across 10 product types, on the UK market for presence of common MPIs or unverified polymeric ingredients of concern
- Identification of known MPIs in 8 cleaning products and in 2 cleaning product types as of January 2017
- Recording unverified polymeric ingredients of concern in 33 cleaning products and in 6 product types as of January 2017
- Directly leveraging commitments from over 30 cosmetics brands, UK retailers and multinational cosmetics companies
- Tracking commitments from more than 50 brands, companies and retailers in total

4.2 Limitations with voluntary corporate commitments

In the process of evaluating corporate MPI policy and monitoring PCCP ingredient data, the following patterns have emerged:

1. A number of companies have made unclear or inadequate public commitments that use ambiguous and narrow definitions of MPIs;
2. Commitments, in some cases, appear only to apply to a very limited range of products or to a specific function, e.g. exfoliation;
3. In some instances, MPIs have been replaced with 'biodegradable' plastics. This creates a risk of replacing 'like-with-like' because currently there are no standardised tests that ensure full marine biodegradability of such alternatives;
4. Some companies have shown disregard for the need for timely phase out of MPIs given the associated environmental impact of these ingredients^{50,51};
5. There remains an ongoing confusion as to which products can be considered 'rinse-off' or 'leave-on'. This is exacerbated by the fact that many 'leave-on' products can be (and are) disposed of via normal drainage channels⁵².

From the ingredient and commitment monitoring described in section 4.1 above, FFI found that products from 11 of the top 20 global beauty companies⁵³ contained MPIs. Given that only 4 of these 11 companies have

made robust, public statements regarding MPI use¹¹, our sample of microplastic-containing products demonstrates that the major UK market share of PCCPs is likely to contain marine environmental pollutants.

Initially, FFI found that many of the companies that it approached to discuss MPI policies were unwilling to engage on the subject. Increasing media coverage over the past four years and a growing body of supporting scientific literature, coupled the international legislative developments, has made MPI use a very public subject and as such, FFI has experienced a noticeable tide change in the willingness and openness of businesses to engage on this issue.

In October 2015, disparate corporate commitments were aligned across the European cosmetics industry when Cosmetics Europe – the pan-European association for Cosmetics and Personal Care companies – issued a public statement recommending the industry work to prepare voluntary "microbead" phase-out commitments in light of "the public concerns expressed over plastic debris in the marine environment".⁵⁴ This recommendation, whilst making some progress, replicated some of the observed limitations of pre-existing corporate commitments discussed herein (see more details in Table 2 below).

5. OVERVIEW OF NATIONAL LEGISLATION RELATING TO MPI USE

5.1 Overview

In the wake of early corporate commitments which denounced the use of MPIs, intense media coverage, scientific studies, political lobbying and international campaigning, draft legislation started to emerge which attempted to formalise key messages and prohibit

ongoing use of MPIs. For many, the use of MPIs was considered the 'low-hanging fruit' in an otherwise seemingly insurmountable problem of marine plastic pollution and announcements of legislative bans were initially widely celebrated (Table 1).

Table 1: Summary of global legislative developments that aimed to prohibit use of MPIs in PCCPs

Country	Recent developments
Australia	The New South Wales government called for a national ban on products containing plastic microbeads in August 2014 and in February 2016 the Environment Minister announced that the Federal Government will consider a national ban in 2017 ⁵⁵
Austria, Belgium, Luxembourg, the Netherlands and Sweden	Joint call to ban the use of microplastics in cosmetics and detergents in the European Union (EU) issued in December 2014 ⁵⁶
Canada	In November 2016 the Canadian Government announced that it will ban the sale of some products containing plastic microbeads in July 2018 ⁵⁷
Denmark	The Danish Minister for the Environment announced in May 2016 that will be putting pressure on the European Commission and Parliament to ban plastic microbeads
France	In October 2016 France had notified the European Commission that it will ban some cosmetic products containing microplastics by January 2018 ⁵⁸
Ireland	The Irish Government committed to banning plastic microbead use in November 2016 as part of a wider marine protection bill ⁵⁹
Italy	A national ban on the use of plastic microparticles in cosmetics in Italy was proposed in May 2016 ⁶⁰
Kenya	In January 2016, Kenya's Bureau of Standards (KEBS) announced it would "discuss use of plastic microbeads in manufacture of cosmetics, soaps and toothpaste products" ⁶¹
New Zealand	In January 2016 New Zealand's Environment Minister commissioned research into the environmental impacts of plastic microbeads and the New Zealand Government began considering a national ban on products containing microbeads ^{62,63}
Singapore	In October 2016 Singapore's National Parks Board claimed it was "looking into assessing the status and impact of marine debris and microplastics" ⁶⁴
South Korea	In September 2016 the South Korean Ministry of Food and Drug Safety announced plans to ban the use of microplastics in cosmetics ⁶⁵
Sweden	The Swedish Chemical Agency proposed a ban on cosmetic products containing plastic microbeads in Sweden through an EU-wide regulation ⁶⁶
Taiwan	In June 2016 the Environment Protection Administration of Taiwan announced plans to ban personal care products and toothpastes containing microbeads ⁶⁷
UK	The UK Government announced plans to ban the sale and manufacture of cosmetic and personal care products containing plastic microbeads in September 2016 ¹³
USA	US Microbead-Free Waters Act signed into law in December 2015 ¹²

5.2 Enacted USA national legislation

In December 2015, the US Senate passed the US Microbead-Free Waters Act, which bans "rinse-off cosmetics that contain intentionally-added plastic microbeads beginning on January 1, 2018" and which bans the "manufacturing of these cosmetics beginning on July 1, 2017". The passing of the Act followed the designation of several similar acts in various US States.

The Act, which is the first piece of national legislation relating to MPI use, repeats some of the observed limitations of the Cosmetics Europe voluntary recommendation regarding definitions and scope of MPI use (see Table 2 below).

5.3 Proposed UK national legislation

In September 2016, the UK Government announced plans to ban the sale and manufacture of cosmetic and personal care products containing tiny pieces of plastic, commonly known as ‘microbeads’, and also pledged to gather evidence on environmental impacts of microbeads used in other products such as household and industrial cleaning products¹³. This announcement followed the publication of an Environmental Audit Committee (EAC, a cross-party group of Members of Parliament) report in August 2016 which urged the Government to introduce the ban and recommended that the “legislation should follow principles set out by Fauna & Flora International around universality and consistency”⁶⁸.

The EAC report summarised the findings and conclusions of the EAC inquiry⁶⁹ conducted in May 2016 regarding the environmental impact of microplastics. As part of these proceedings, the Committee directly consulted a wide range of relevant stakeholders. These included prominent scientists in the field of marine plastic pollution; FFI and NGO partners MCS and EIA; Cosmetics Europe, the British Plastic Federation (BPF); major multinational PCCP manufacturers as well as Department for Environment, Food & Rural Affairs (Defra) representatives.

At the NGO hearing organised by the Committee, FFI argued that the voluntary measures taken by the industry to date have not succeeded in ending the use of polluting MPis effectively due to inconsistencies in the

standard of voluntary commitments made by different companies⁷.

The opportunity for UK national legislation to overcome the inconsistencies of the industry voluntary commitments and the US Microbeads-Free Water Act of 2015 is made clear in Table 2, where “ideal” legislation is compared to both the Cosmetics Europe voluntary recommendation and the US Microbead-Free Waters Act.

In December 2016, Defra launched a public consultation on its proposals to ban the manufacture and sale of cosmetics and personal care products containing microbeads which may cause harm to the marine environment⁷⁰. The proposals published in this consultation have one major limitation in comparison to the “ideal” legislation as demonstrated by the assessment in Table 2. This proposed UK microbeads ban uses the ambiguous term ‘rinse-off’, which reflects how long a product might stay on the skin rather than the likelihood of the product to go down the drain and reach the marine environment⁷¹. This is a significant limitation because it means that the ban would not necessarily apply to products such as make-up which:

- are often considered ‘leave-on’⁴⁵ but
- can often go down the drain in practice⁵² and
- are known to contain known MPis commonly used in solid, water-insoluble form^{44,45} (see Appendix 3 for examples).

Table 2: Comparison of ideal microplastic ingredient legislation, the US Microbead-Free Waters Act 2015, the Cosmetics Europe voluntary phase-out recommendation and the Defra proposals to ban the use of plastic microbeads in the UK (as of January 2017)

Legislation/recommendation	All solid plastic ingredients included? ⁷²	All product types reaching domestic or industrial drainage? ⁷³	"Biodegradable plastics" exemption absent?	Deadline for implementation	Ingredient definition	Product type definition
Ideal microplastic ingredients legislation (i.e. "gold standard")	✓	✓	✓	Two years from announcement	any solid, water insoluble, plastic particulate ingredient of 5 millimetres or less in size, performing any function in a product	any product that is, or can be, discharged to domestic or industrial drainage after its use
US Microbead Free Waters Act 2015¹²	✗	✗	✓	2017 (two years from announcement)	"any solid plastic particle that is less than 5 millimeters in size and is intended to be used to exfoliate or cleanse the human body"	"rinse-off cosmetics... (the term 'rinse-off cosmetic' includes toothpaste)"
Cosmetics Europe voluntary phase-out recommendation⁵⁴	✗	✗	✗	2020 (five years from announcement)	"synthetic, solid plastic particles used for exfoliating and cleansing that are non-biodegradable in the marine environment"	"wash-off cosmetic products" (<i>no further details given</i>)
Defra proposals to ban the use of plastic microbeads in cosmetics and personal care products in the UK (published in December 2016)⁷⁰	✓	✗	✓	2018 (two years from announcement)	"solid microplastic ingredients < 5mm in size in every dimension"	"rinse-off cosmetics and personal care products including but not limited to exfoliating scrubs, shower gels and toothpastes"

6. FFI'S PRINCIPLES OF A ROBUST CORPORATE COMMITMENT OR NATIONAL LEGISLATION RELATING TO MPI USE

6.1 Evolution of the FFI principles

Given the apparent disparities between published position statements on MPI use across the sector regarding the definition of MPIs and scope of phase out commitments, FFI developed a set of seven guiding principles to ensure that the use of MPIs – in any product sector and by any company – does not add to the growing environmental problem of marine litter.

The seven principles are intended to act as guidance for both commercial entities and policymakers to ensure that their attempts to either phase out or ban MPIs are robust, future-

proof and that there is consistency and a 'level playing field' across the industry. The principles and founding rationale are presented in Table 3. For an in depth review of the information that shaped each rationale – including references to relevant evidence sources – please see detailed principle guidance in Appendix 6.

In addition to robust corporate commitments, effective and expansive national legislation is vital to ensure MPIs do not become marine litter.

Table 3: FFI's principles of a robust corporate commitment or national legislation relating to MPI use.

Principle:	Rationale:
1. Restriction of all microplastic ingredients	Any plastic that reaches the environment can become marine litter. Many different plastic polymers are used as MPIs in household, consumer and industrial products. Only the use of the term "all microplastic ingredients" to describe what is being removed in a corporate commitment or being banned in a piece of legislation is adequate.
2. Application to all 'down the drain' products'	Any product containing MPIs that can be proven to be disposed of (either by design or user behaviour) down a drain poses an environmental risk. Only the use of the term "all 'down the drain' products" to describe the product range that a corporate commitment or piece of legislation applies to is adequate.
3. No exemption for non-marine-tested synthetic solid ingredients	Encouraging the use of "biodegradability" as a solution to marine plastic litter has consistently been viewed with caution by the scientific community. There are no known replacements for MPIs that are synthetic and have been conclusively demonstrated to fully biodegrade in marine environmental conditions. In restricting or removing MPIs, policymakers and corporates should not encourage the introduction of solid, water-insoluble synthetic materials that have not been shown to fully biodegrade in marine environmental conditions.
4. No exemption for plastic ingredients below a certain size	Any plastic particle, of any size less than 5mm, is a microplastic. Previous corporate and trade body definitions of MPIs have sought to apply a minimum size limit. No exemptions should therefore be made for MPIs below a certain size.
5. Implementation within an ambitious timeframe	Several multinational brands have set implementation timelines – albeit of imperfect MPI phase-out commitments – of two years from the date of announcement. This is the timeframe of the US ban. It therefore seems reasonable this become the standard timeframe for either legislation to be enacted or corporate commitments to be fully implemented.
6. Applies to all brands in a company's portfolio	<i>(NB does not apply to restriction of MPIs, only corporate removal).</i> Discrepancies have occurred between brands in company's portfolios. A robust corporate commitment should therefore come from parent company level and apply to all brands in the company's portfolio.
7. Applies to all future formulations of products	<i>(NB does not apply to restriction of MPIs, only corporate removal).</i> A robust corporate commitment should obviously apply to all future formulations of products.

7. SUMMARY

7.1 Key learning outcomes of work to date

FFI's work on microbeads and its work with corporate businesses have grown organically over the past five years. FFI has worked diligently to remain well-informed, constructive in its approach and participatory in all matters relating to this field of work. Despite establishing a clear link between the use of MPIs and marine microplastic pollution,

the nuances of this subject are varied and significant. For example, simply defining a 'plastic' ingredient proves challenging in a multi-stakeholder environment³⁷. Similarly, defining product types to review (i.e. rinse-off or leave-on products⁷¹) is challenging depending on point of view.

7.2 Purpose of FFI's principles and guidance

Overall, there has been a notable step-change in corporate position relating to MPI use with many sectors now openly working together to effectively solve this issue. Despite this promising progress, evidence gathered during FFI's latest monitoring of product ingredient lists has revealed that in the UK, the issue is still far from being resolved (as of January 2017):

- out of 58 down-the-drain PCCPs that contained known MPIs in 2012-2015, 28 or nearly half were still found in UK shops with the same known MPIs in September-December 2016 and
- out of the other 30 products, which used to contain common MPIs in 2012-2015 but in September-December 2016 were found

in UK shops with new formulas no longer containing any known MPIs:

- 16 (more than half) contained unverified polymeric ingredients of concern which could be MPIs and
- only 14 (less than half) contained no known MPIs or unverified polymeric ingredients of concern (see Appendix 3 for a more detailed summary).

FFI's principles of a robust corporate commitment or national legislation relating to MPI use are intended to guide and inform companies and policymakers intending to reduce the potential for MPIs in consumer and industrial products to become marine plastic litter.

We ask that these principles are considered by any company, brand, product formulator or ingredient manufacturer that wants to reduce the accumulation of marine plastic litter by phasing out microplastic ingredients from their products.

We also ask that the principles are considered by any regional, national or international policymaker that wants to reduce the accumulation of marine plastic litter by banning the sale, manufacture or import of microplastic ingredients (and/or products containing them).

8. LIST OF APPENDICES

Appendix 1	Examples of demonstrated/potential impacts of marine microplastic pollution on biodiversity
Appendix 2	Summary of published definitions of microplastic ingredients (MPIs)
Appendix 3	Summary of microplastic ingredient (MPI) data from UK product database
Appendix 4	Recorded examples of unverified polymeric ingredients of concern found in personal care and cosmetic products (PCCPs) or cleaning products on the UK market
Appendix 5	Voluntary corporate commitments provided to Fauna & Flora International and the Marine Conservation Society by UK and/or international companies with regard to microplastic ingredient (MPI) use
Appendix 6	Detailed guidance on FFI's principles, including evidence sources, designed to support delivering of effective legislation governing microplastic ingredient (MPI) use

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¹ In accordance with the definition widely accepted by the international marine litter scientific community, we define “microplastic” to be any piece of solid synthetic polymer of 5mm or less in size. We define “primary microplastics” as pieces of solid synthetic polymer of 5mm or less in size that are manufactured at that size, as opposed to “secondary microplastics”, which we define as pieces of solid synthetic polymer of 5mm or less in size resulting from the degradation of larger plastic items.

In order to address all polluting plastic ingredients that are relevant to the marine litter debate, we define “solid, water-insoluble microplastic ingredients” as any solid, water-insoluble synthetic polymers of 5mm or less (with no lower size limit), used in any personal care and cosmetic product or domestic cleaning product, for any function. “Microbeads” have often been defined as any solid, water-insoluble synthetic polymers of 5mm or less (with no lower size limit), used in specific personal care and cosmetic products – including, but not limited to, face scrubs and body scrubs – for the specific purpose of skin cleansing and exfoliation. Given our focus on “reducing the marine environmental input” of polluting plastic ingredients, we focus on all product categories that can reach the marine environment i.e. those whose most common use involves their disposal via domestic drainage.

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⁶ Given the level of the wastewater treated and observed volumes of microplastic ingredients in wastewater effluent.

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