

## MARINE PLASTICS POLLUTION POLICY AND POSITION STATEMENT

### SUMMARY OF OUR POLICY, 'ASKS' AND ACTIONS

#### Our Policy

MCS is of the opinion that:

- Plastics in themselves are useful materials and are an essential component of everyday life.
- Too much plastic is thrown away or used in unnecessary packaging.
- Not enough goods are made of recycled plastics and there are not sufficient resources to recycle all types of plastics.
- Plastics are made from non-renewable resources and consequently much more effort needs to be made to reduce, reuse and recycle all types of plastic.
- A precautionary approach to the presence of plastic litter in the environment should be taken.
- Plastic needs to be recognised as a significant and extensive marine pollutant.
- We support efforts by all sectors to work to reduce the effects of plastics on the marine environment.

#### Our 'Asks'

MCS is asking **all UK administrations** to:

- Formulate coherent marine litter strategies and action plans.
- Appoint a lead body to implement these strategies.
- Commit to having meaningful and ambitious litter targets in the Marine Strategy Framework Directive (MSFD).
- Work with signatory countries to ensure the statutory enforcement of waste reduction measures under the OSPAR and MARPOL Conventions.
- Invest in enforcement of domestic legislation covering the proper disposal and clearance of litter from terrestrial and aquatic environments.
- Properly enforce current legislation for the protection and progressive improvement of the aquatic environment, and ensure polluters pay costs that truly reflect the damage they cause, in accordance with the Environmental Liability Directive.
- Ensure that the revised Port Reception Facilities (PRF) regulations bring in a 'No Special Fee' system across Europe.
- Extend existing PRF regulations to include all fishing vessels.
- Expand national kerbside plastic recycling schemes and infrastructure.
- Expand business plastic collection and recycling schemes.
- Ensure that plastics are sent to landfill or Energy from Waste plants only after all other recycling and reuse possibilities have been undertaken.
- Introduce a drinks bottle and can deposit scheme throughout the UK.
- Introduce a charge on all single use bags in England with no exemptions for small

businesses or paper and biodegradable bags

- Ensure the proper provision, and maintenance, of public litter bins.
- Fund national, community based educational campaigns to encourage the public to 'Bag It and Bin It', reducing the amount of sewage-related debris reaching the environment.
- Fund research on:
  - The ability of microplastics to adsorb toxins and to be ingested by marine wildlife.
  - The potential for these toxins to bioaccumulate up the food chain.
  - Increasing the understanding of plastic degradation times and their breakdown products.
  - Introducing a 'no blame' reporting system for reporting lost or abandoned fishing gear.
  - Introducing recycling and disposal facilities for fishing nets and lines at port and harbours.
  - The impact of liquid plastics on the marine environment.
  - The sources of ocean-borne litter through major currents and marine industries around the UK

MCS is asking the **plastics industry and manufacturers** to:

- Investigate ways of reducing the number of different plastics types on the market to simplify the recycling process.
- Undertake further investment and research into plastic recycling of all types; not just bottle grade plastic.
- Invest in infrastructure for collection and recycling of fishing net and line.
- Undertake research and investment into ways of replacing unsustainable plastic packaging with alternatives that are less harmful to the environment.
- Tighten packing, transport and shipping procedures to reduce the loss of plastic pellets to the marine environment and introduce a compulsory code of conduct for the safe handling, packaging and transportation of plastic pellets.
- Actively support product levy and deposit schemes.
- Remove solid plastic beads and particles from all personal care and household cleaning products.
- Appropriately label all bathroom and sanitary products such as wet wipes, tampons and sanitary towels, particularly those that are made wholly or partly of plastic, as non-flushable.
- Help promote litter reduction campaigns.

MCS is asking the **water industry** to:

- Improve the management of sewerage networks and combined sewer overflows (CSOs) to reduce the discharge of untreated dilute sewage and sewage-related debris to rivers and the sea during heavy rainfall.
- Help promote campaigns such as 'Bag it and Bin it' to reduce the amount of litter at source.

MCS is asking **individuals** to:

- Reduce their use of plastic packaging, and reuse and recycle wherever possible.
- Take responsibility for safe disposal of all litter items whether at home, work or on

- holiday, using bins provided, and not flushing plastic products into sewerage networks.
- Lobby local and national government to put in place appropriate litter reduction schemes, e.g. proper bin provision, carrier bag levies and bottle deposit schemes.
  - Support clean-up schemes to remove litter from the environment before it reaches the sea.
  - Support beach clean schemes to remove litter from beaches

### **Our Actions**

In order to make continuous progress towards achieving the asks in the previous section, MCS will develop constructive working relationships with other environmental NGOs worldwide who have shared concerns about plastics. In particular MCS will strive to:

- Identify named contacts for (i) UK administrations and (ii) industry and communicate the contents of this PPS to them.
- Develop constructive working relationships with the plastics industry who have shared concerns about plastics.
- Actively engage, inform and influence the relevant bodies within each UK administration to ensure that the effects of marine litter and plastic in particular are sufficiently understood and that priority is given to further research particularly with regard to the effect of microplastics.
- Ensure that marine litter is given appropriate consideration by the appropriate Link organisations by highlighting its relevance to any work undertaken by these organisations.
- Actively campaign to reduce marine litter at source.

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## 1 Purpose

The purpose of this Pollution Policy and Position Statement (PPPS) is to identify the key issues related to the environmental impacts of plastic pollution which have been used to formulate our position in relation to plastics.

The blue box at the beginning of this PPPS contains a summary of our policy, 'asks' and actions; the rest of this document provides the evidence, discussion and reasoning behind these, if the reader requires further detail or explanation of any of these points.

This PPPS continues our theme of evidence-based campaigning and dissemination of information relating to the environmental impacts of human activities on our seas and coastline, using publicly available documents and data. Wherever possible, references have been used from robust sources; a complete list of references has been given at the end of this document in Appendix 3.

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## 2 Geographic Extent of this Pollution Policy and Position Statement

This PPPS applies to the whole of the UK and attempts, wherever possible, to take into account issues relating to England and those devolved to Scotland (and the Scottish Government), Wales (and the Welsh Government) and Northern Ireland (and the Northern Ireland Executive) respectively. Throughout this document, the collective term "UK administrations" is used to refer to these four separate bodies.

### 3 Background

Plastics, as we now know them, were first used at the turn of the turn of the 20th century. There were two pulses of innovation and progress after each World War and the global production of plastics is now around 265 million tonnes per year. This represents a growth rate of 4.5% per annum over the past 20 years (Plastics Europe 2011). In 2010, Europe accounted for 57 million tonnes (21.5%) of global consumption with 39% of this plastic being used for packaging. Growth in the production of plastics is likely to continue to rise at present rates of use and consumption.

Plastics are extremely durable, lightweight, cheap and versatile; features which have resulted in their replacing many traditional materials, such as metal, glass and wood. Plastics can be an extremely useful material and are now a part of everyday life. However, the material attributes that have led to the extensive use of plastics in the packaging, consumer and fishing industries have unfortunately also made them one of the most pervasive, persistent and hazardous form of litter in the marine environment.

Plastics are made of long chain hydrocarbons that few micro-organisms can break down. Plastics at sea break down at a much slower rate than plastics exposed to weathering on land (Packforsk, 1989) mainly because temperatures at sea will generally be lower, thus slowing the degradation process. The rate of breakdown can be further reduced by chemical or biological fouling (Andrady, 2000).

Estimates for plastic degradation at sea range from 450 to 1,000 years. However, plastics may never fully degrade; they simply break down into smaller and smaller fragments and ultimately into microscopic plastic pieces or plastic dust.

At present responsibility for marine litter is spread over several state bodies, e.g. local authorities, Maritime and Coastguard Agency, Environment Agency and there is no overarching strategy for tackling marine litter as there is for terrestrial waste.

There are areas of significant concern over the effects of plastics and their degradation products on wildlife and over the social and economic costs of marine litter which urgently need further research and attention.

We believe that the precautionary principle must be used when working with marine plastics. This states that if an action or policy has a suspected risk of causing harm to the public or to the environment, in the absence of scientific consensus that the action or policy is harmful, the burden of proof that it is not harmful falls on those taking the action. In the case of marine plastics there is clear evidence for

ecological and economic harm; therefore a series of measures should be implemented to drastically reduce the input of plastic to the marine environment from all sources.

A comprehensive list of European Union (EU) Directives, Acts of Parliament and Statutory Instruments which together form the legislative framework governing the use and disposal of plastics, is given in Appendix 1, whilst a list of useful websites is given in Appendix 2. A list of acronyms used throughout this PPS is given in Section 9.

## 4 Introduction

The United Nations Environment Programme (UNEP) states that “marine litter poses a vast and growing threat to the marine and coastal environment” (UNEP 2005). If no action is taken litter will continue to accumulate and increase in the marine environment and on our beaches. This will affect wildlife, ecosystems, the tourism and fishing industries and the UK taxpayer.

Our ‘throw-away’ consumer culture discards a growing number of unwanted plastic items that persist in the environment, resulting in the accumulation of plastic litter at sea and on beaches with environmental, economic and social consequences.

Due to their lightweight nature, many items of plastic will float on the surface of the sea, or within the water column, where they can harm wildlife, foul fishing gear and cause a hazard to small craft. Floating debris can also be transported substantial distances by wind and currents, resulting in the deposition of items from many different countries on beaches around the world.

Despite legislation aimed at preventing the dumping of litter at sea, such as the MARPOL Convention and Port Waste Reception Facilities Regulations, together with increasing public awareness of waste and recycling, quantities of litter on UK beaches have shown no appreciable decrease over the last 20 years. Average litter densities on UK beaches are now over 2,000 litter items/km surveyed.

MCS has co-ordinated Beachwatch, a UK-wide beach litter survey and clean up since 1994. Through these surveys we have recorded an increase in the amount of plastic litter on UK beaches and this trend is reflected in a number of other surveys throughout the world. Plastic items have always dominated the litter found during Beachwatch surveys and consistently account for over 50% of all litter. The amount of plastic litter items/km in the same period has increased by around 180% (now ca. 1,400 items/km).

Most items of sewage related debris (SRD) are now entirely or partially made of plastic, and polystyrene is also a form of plastic. In 2014 these accounted for 5.4% and 7.8% of all litter respectively. Thus the percentage of beach litter caused by all plastics is over 70%. See Table 1.

<b>Year</b>	<b>Plastic items / km</b>	<b>% of Total Litter</b>
1994	530.0	54.8
1995	845.0	53.0
1996	770.0	51.8
1997	881.0	56.7
1998	1095.1	56.6
1999	971.7	51.9
2000	891.0	51.5
2001	1053.9	52.1
2002	914.7	59.3
2003	1206.2	58.9
2004	1095.4	61.6
2005	1173.3	60.3
2006	1041.6	56.3
2007	1187.7	59.9
2008	1308.7	61.0
2009	1219.4	64.1
2010	1215.5	63.5
2011	1040.7	61.4
2012	1228.8	63.1
2013	1433.4	62.1
2014	1487.5	60.5

(NB excludes polystyrene and SRD)

**Table 1: Comparison of plastic items recorded during MCS Great British Beach Cleans 1994 – 2014**  
(Percentages and items/kilometre are recorded to 1 decimal place)

In 2011, the then UK Environment Secretary, Caroline Spelman MP, in the Review of Waste Policy in England stated “we are committed to working towards a zero waste economy as part of the transition to a green economy and our commitment to be the greenest government ever”. This zero waste economy must acknowledge and include the marine realm as well as the terrestrial.

The issue of marine litter and the need to reduce litter at source must be addressed urgently by all concerned, including local authorities, port authorities, water companies, industry, user group organisations, the public and governments at local, national and international levels.

## 5 Key Issues

The following provides a brief overview of the evidence of the impacts of plastics in the marine environment, showing that plastic is a serious environmental pollutant. .

### 5.1 Scale of the problem

Plastic litter can be found on the sea floor, water column, sea surface and shorelines. It can be found in all seas and oceans including the Polar regions and uninhabited areas. Marine litter knows no boundaries and can be carried around the world's oceans by winds and currents for many years. The concentration of litter in oceanic gyres leading to so called 'garbage patches' is well documented and these have now been reported from most of the world's major gyres (Law *et al.*, 2010; Moore *et al.*, 2001).

Litter can be found on every beach in the world, even those on remote and uninhabited islands. MCS reports that the average number of items/ km on UK beaches is now over 2,000 (MCS 2014), while an OSPAR study on the beaches of Northern Europe reported, on average, 712 items/100m (OSPAR 2010).

A study of the distribution and abundance of large marine debris on continental shelves and slopes in European seas recorded concentrations up to 101,000 pieces of debris per km<sup>2</sup> (Galgani *et al.*, 2000). At most sample stations, plastic (mainly bags and bottles) accounted for more than 70% of the total debris.

Studies of seabed litter have also highlighted the extent of the problem, as plastic items are still the most commonly found despite their supposed buoyancy. In the Irish Sea, plastic items comprised 94-98% of litter found on the seabed during trawls in March 1996 and August 1999, the majority of plastic items were plastic bags and food wrappers (Tang, 2005).

80-85% of the seabed debris in Tokyo Bay is plastic (Kanehiro *et al.*, 1995; Derraik, 2002) and seabed trawls have reported increased amounts of plastic waste on the seabed of the Eastern Mediterranean, with the proportion of plastic waste increasing from 0.7% of the total litter in 1975 to 36% in 1993 (Galil *et al.*, 1995).

### 5.2 Sources of marine litter

Identification of the sources of marine litter is vital to ensure that preventative measures are directed effectively. Litter enters the marine environment and is deposited on beaches from a variety of sources, including direct littering by beach visitors, discarded fishing gear from fishing vessels, illegal dumping by ships and small marine craft, sewage discharges, CSOs and fly-tipping.

Litter is also carried by rivers, streams and winds into coastal waters, so littering in urban areas can make a significant contribution to marine litter. Much of the litter accumulates along the strandline deposited by

the incoming tides, whilst sand dunes, groynes, rocky areas and promenades also act as sinks or traps for wind-blown litter.

Lost or discarded fishing gear is one of the most hazardous forms of litter for wildlife through entanglement and ingestion, and also poses a threat to fishermen and other seafarers through fouling of active fishing gear and ship propellers.

The incidences of deliberate dumping of shipboard waste are unfortunately unknown. However, the amount of waste attributable to shipping does not seem to have changed appreciably since the introduction of the MARPOL regulations and to date there have been only three UK prosecutions for illegal dumping of waste at sea.

The occurrence of sewage related debris on UK beaches is often the result of the public using the toilet as a 'wet bin'. An estimated 1.5 to 2 billion items of sanitary protection are flushed every year in the UK, in addition to 61-100 million condoms (National Bag It and Bin It Group, 1997). Many items flushed down the toilet will find their way onto our beaches through the sewerage network, particularly via combined sewer overflows (CSOs). This is an attitude not shared by many other European countries, consequently sanitary items are found in much lower numbers on continental European beaches (Flanders Marine Institute, 2006).

### 5.3 Effects on wildlife

Marine litter can directly harm wildlife as a result of entanglement and ingestion.

Laist (1997) stated that plastic has been reported to affect 267 species worldwide, including 86% of sea turtle species, 44% of all seabird species and 43% of all marine mammal species. Since this list was compiled further affected species have been reported, including killer whales, white-beaked dolphin and the northern bottlenose whale (Baird and Hooker, 2000).

Sub lethal effects of plastic ingestion and entanglement include difficulties in feeding and a decreased ability to survive and/or reproduce and increased energy needed for swimming. These are difficult to quantify, but are probably more common than lethal effects (Ryan, 1990; Pemberton *et al.*, 1992).

It is difficult to assess the true rate of entanglement or ingestion of litter by marine wildlife as many animals that die as a result of entanglement or ingestion may sink to the seafloor, or be consumed by predators before being found and only a minority of animals will be washed up on our shores. Therefore entanglement and ingestion records represent an unknown proportion of all those that occur and are a conservative estimate of the actual scale of the problem.

An area of increasing concern is that of microplastics and whether they have the capacity to carry toxins up and through the food chain (see section 5.5.1).

### 5.3.1 Ingestion

At least 177 marine species have ingested litter items and 111 of the world's 312 species of seabird are known to have accidentally eaten plastic. Ingestion of litter can cause physical damage and mechanical blockage of the oesophagus and digestive system, leading to internal infections, starvation and death (Laist, 1997).

Studies around the world have shown that debris, particularly plastic litter, is being found in a high proportion of autopsied turtle stomachs (Bugoni *et al.*, 2001; Balazs, 1985; Tomas *et al.*, 2002; Mrosovsky *et al.*, 2009; Godley *et al.*, 1998; Lazar and Gračan, 2011).

Plastic litter items including bags, wrappers, packaging and fishing gear have been found in whales, porpoises and seals (GECC, 2002; Deaville, 2006; Tarpley and Marwitz, 1993; Secchi and Zarzur, 1999; Baird and Hooker, 2000; BDMLR, 2004).

Seabirds can confuse small plastic pellets and pieces with fish eggs, plankton or other food and will often feed plastics to their chicks. The birds most susceptible to ingestion of plastic particles are surface-feeders (such as albatrosses, shearwaters, petrels and gulls) and plankton-feeders (e.g. auklets, puffins) (Day, 1985). The majority of debris found in the stomachs of dead Laysan Albatross chicks on Midway Island in the Pacific is plastic instead of food fed to them by the parent birds.

Research into the stomach contents of dead Fulmars from the North Sea has been carried out since 1979. From this work the following Ecological Quality Objective (EcoQO) for the North Sea has been suggested: "There should be less than 10% of Northern Fulmars having 0.1gram or more plastic in the stomach in samples of 50-100 beach washed Fulmars from each of five different regions of the North Sea over a period of at least five years".

Averaged for the whole North Sea, 94% of fulmar's stomachs contain plastic; the stomach contents typically consist of 34 individual pieces, totalling on average 0.30g, and 55% of all birds exceed the EcoQO level of 0.1g of plastic in the stomach (Van Franeker *et al.*, 2008).

Researchers have found fragments of plastic in the stomachs of 35% of fish in the North Pacific in a 2008 study. They noted that on average each fish had ingested two pieces of plastic (Boerger *et al.*, 2010). Other organisms such as sea cucumbers and lobsters have also been shown to ingest plastic litter (Graham and Thompson, 2009; Murray and Cowie, 2011).

### 5.3.2 Entanglement

At least 136 species of marine vertebrate and eight invertebrate species have been entangled in marine debris, including six of the seven marine turtle species, 11 cetacean species (whales and dolphins), 19 pinniped species (seals and sea lions), 51 species of seabird and 34 fish species (Laist, 1997).

A variety of litter items can entangle marine species. Items such as fishing nets, fishing line, plastic bags, strapping bands and four/six-pack yokes can reduce movement and potentially result in serious injury, death by starvation, drowning or suffocation.

During the 2014 International Coastal Cleanup 72 birds, 55 fish, 113 invertebrates, 7 mammals, 3 reptiles, 3 corals/sponges and 4 turtles were found entangled. The top three entangling items were 1) Fishing line, 2) fishing nets, 3) beverage cans (Ocean Conservancy, 2014).

Certain seabirds collect marine litter such as pieces of plastic for nest building, which can result in both adults and chicks becoming entangled. In the UK, a study of gannet nests on Grassholm Island, Pembrokeshire, recorded that over 80% of the nests contained plastic (Votier *et al.*, 2010).

As gannets collect almost all of their nest material at sea this indicates the extent of plastic pollution in surrounding waters. Young gannets' feet can often become entangled, resulting in serious injuries, and each Autumn RSPB staff travel to the island to cut free birds entangled in netting and plastic. Over the eight years from 1996 to 2010, 525 birds were found entangled. At this time the young birds were still being fed by the adults, which would have shortly left the island. The entangled young would have starved to death if they had not been freed (Votier *et al.*, 2010.). A study in 1991 found 97% of all gannet nests sampled in Newfoundland had plastics incorporated into them (Montevecchi, 1991).

European Shags in the Iroise Marine National Park are also using significant quantities of marine litter particularly rope, fishing net and line as nest material (Cadiou *et al.*, 2011).

Plastic can also kill coral by covering and suffocating the living polyps from which coral is made, or by blocking sunlight needed by the coral to survive. During 2001 so many plastic bags were regularly seen in the Gulf of Aqaba, off the coast of Jordan, that the Board of Aqaba Special Economic Zone issued a law banning the production, distribution and trade of plastic bags.

## 5.4 Socio-economic costs

Coastal communities, many of which rely on the marine environment for their livelihood through tourism, fishing and recreational water sports, continue to pay the price for marine and coastal litter. Revenue is lost through spoilt fish catches, lost tourism income and damage to property. Sewage-related debris on beaches can have adverse effects on tourism. Local authorities, and ultimately taxpayers, bear the huge

financial burden of clearing litter from UK beaches. It has been calculated that the UK spends approximately €18 million removing beach litter every year (KIMO, 2010).

A recent study of the cost of marine litter to the countries of the Asia-Pacific rim estimated that costs to marine industries were in the region of US\$1.26bn and stated that 'the intrinsic value of the ocean and its capacity to provide ecosystem services are being compromised by plastics at an unknown cost' (McIlgorm *et al.*, 2011).

Marine litter also results in lost revenue for fisheries, due to the time and effort involved in sorting debris from the catch, while larger items may actually tear fishing gear. Fouled propellers and pierced hulls caused by litter can also endanger human life if vessels cannot be operated. A survey of fishermen in Shetland reported that 92% had accumulated marine debris in their nets; 69% had had their catch contaminated and 92% had snagged their nets on debris on the seabed (KIMO, 2000). Costs associated with the time dealing with marine litter to the Scottish fishing fleet are between €11.7million and €13 million per year (KIMO, 2010).

Commercial fishing interests can be affected when fisheries resources are depleted by 'ghost fishing', where lost or abandoned nets and traps continue to capture target and non-target species long after the nets have been lost or discarded at sea or on the seabed. This also reduces reproductive potential, as the nets may capture immature fish that have not yet produced offspring.

Even when the lost nets sink from the weight of their 'catch', the persistent nature of the plastics from which they are made means that they can continue to damage the seabed and affect commercially important shellfish species for many years. An estimated \$250 million in marketable lobster is lost every year due to ghost fishing (Global Marine Litter Information Gateway, 2004).

Fishermen report that plastics foul propellers and that plastic bags and sheeting clog seawater intakes and evaporators, causing engine failure, costly repairs, and delays. This type of vessel disablement can be life threatening. In the past 10 years (2002-11) RNLI Lifeboats have launched 7,049 times in total to commercial fishing and angling vessels. Out of these, 2,124 (30%) were attributed to a fouled prop (RNLI pers. comm. 2012), although not all of these may have been due to litter.

Farmers are also affected by wind blown marine litter blocking drainage ditches and harming livestock through entanglement and ingestion. In Shetland, crofters with land adjacent to the coast reported nets, plastic bags and containers blowing on to their land, and 36% had incurred problems with animals becoming entangled in net, rope or plastic strapping. 20% of those surveyed had animals which had become ill due to ingesting plastic (KIMO, 2000).

The Shetland agricultural community can also lose seaweed harvests due to increased levels of plastic entangled in seaweed. The potential for plastics to get caught in the fleece of sheep, leaching toxins into the wool, which can affect wool quality, is another problem that requires further investigation (KIMO, 2000).

## 5.5 Items of particular concern

Certain items of litter are of particular concern, either because of the large densities of these items on UK beaches or because of the hazard they pose to marine wildlife.

### 5.5.1 Microplastics and plastic pellets

Microplastics defined as particles less than 5mm are now widespread in the marine environment. Primary microplastics arise from the plastic pellets produced by chemical companies for use in the plastics manufacturing industry and from particles and beads in personal care and household cleaning products. Secondary microplastics arise from the breakdown of larger plastic items.

As plastic items slowly break down smaller and smaller fragments and fibres are created. In a study of Northumbrian sand samples, microscopic fibres (0.1 mm - several mm in length) were found in 100% of 45 samples collected, some with more than 10,000 fibres per litre of sand (Thompson and Hoare, 1997). Even beaches that were considered visually clean were found to have up to 5,000 fibres per litre of sand.

Studies of sediments taken from 23 sites around the UK coastline found microplastics to be common in sedimentary habitats, and most common in subtidal sediments (Thompson *et al.*, 2004).

Microscopic plastics have also been found in plankton samples and show a significant increase in abundance from the 1960s to the present day (Thompson *et al.*, 2004). According to surveys collected by Continuous Plankton Recorder (CPR), microscopic plastic fragments appear to be increasing in the NE Atlantic and have been doing so over the last 40 years. The incidence of monofilament netting snagged by the CPR towed body also seems to be increasing, particularly in the southern North Sea (Edwards *et al.*, 2007).

Billions of small plastic pellets are produced every year and many end up in the oceans via effluent, accidental spills or from ship leakages (Ananthaswamy, 2000). In 1989, over 100,000 raw plastic granules were recorded per metre of coast in New Zealand (Gregory, 1989 in Derraik, 2002). These pellets are commonplace on many beaches around the UK, but their small size means they often go unnoticed. Plastic pellet durability is uncertain but a 'life-span' of 3-10 years has been estimated, with additives possibly extending this to 30-50 years (Gregory, 1978 in Derraik, 2002).

A more recent, less studied source of plastic pollution is from the tiny plastic fragments used in some cosmetic preparations, hand cleansers and industrial air blast cleaning media, which reach the marine environment through foul water and sanitary systems (Derraik, 2002). Plastic particles in sewage plants have also been sourced to runoff from the land and microparticles originating from washing machines (Browne *et al.*, 2011, Leslie *et al.*, 2011).

#### 5.5.1.2 *Microplastics - threats to wildlife*

Microplastics may pose a significant threat to wildlife.

The suspension of tiny plastic fibres in the water column can potentially clog the feeding apparatus of small invertebrates. Laboratory studies have shown that amphipods, lugworms, and barnacles kept in aquaria with microscopic plastic present will ingest the plastics within a few days (Thompson *et al.*, 2004).

Toxic compounds are incorporated into plastic pellets during production as plasticizers and other additives (Mato *et al.*, 2001). Plastic pellets in the marine environment can therefore carry two types of organic micropollutants. Firstly, the additives and their degraded products such as nonylphenols (an endocrine disruptor), and secondly pollutants adsorbed from seawater such as Polychlorinated biphenyls (PCBs) and Dichlorodiphenyldichloroethylenes (DDEs) (Takada *et al.*, 2006).

Pellets can concentrate PCBs and DDEs from seawater to levels up to a million times greater than in the surrounding seawater, posing a potential hazard for birds and fish which mistake the pellets for food such as fish eggs (Ananthaswamy, 2000). Ultimately, these pollutants may then be passed up the food chain to fish and to human consumers.

PCBs have also been linked to the masculinisation of female polar bears and spontaneous abortions and declines in seal populations. In 1988, Ryan *et al.*, obtained evidence that PCBs in the tissues of Great Shearwaters were derived from ingested plastic particles (from Derraik, 2002).

Toxins adsorbed onto plastic may be ingested by filter feeders (Thompson, 2004), and passed up the food chain to fish and ultimately to human consumers. The accumulation of microscopic plastic fibres in sand substrates may leach out toxins such as PCBs and heavy metals (Thompson and Hoare, 1997). These can be absorbed by micro-algae and thus also potentially enter the food chain. The ecological impact, if any, is still uncertain and further research is needed in this area.

#### 5.5.2 *Fishing litter*

Lost or abandoned fishing gear is one of the most hazardous forms of plastic litter for wildlife indiscriminately catching or entangling a wide range of birds, turtles, fish, crabs and marine mammals. It also poses a threat to other sea users through fouling of ship propellers and active fishing gear,

Fishing debris washing up on beaches probably represents only a small proportion of that lost at sea. Despite this, during MCS' annual UK-wide September beach clean and litter survey the Great British Beach Clean (GBBC), in 2014 fishing related debris accounted for over 11% of total litter found on UK beaches, with a density of around 272 items of fishing debris per km.

### 5.5.3 Plastic Bags

8.3 billion single use bags were given away in UK in 2013 (WRAP, 2014). During the Great British Beach Clean 2014, 5,199 plastic bags were found on 300 beaches around the UK. On average 47 bags were found for every kilometre of coastline surveyed. Plastic bags ranked number 16 in the top 20 most common litter items recorded, accounting for almost 2% of all beach litter.

Over the period 1996 – 2014, MCS Beachwatch litter surveys have recorded averages of between 29 - 48 bags per km surveyed. Since 1996 the average density of plastic bags found during Beachwatch has increased by 30%.



**Figure 1: Plastic bags recorded per km surveyed during MCS Great British Beach Cleans 1996 – 2014.**

During the 2013 International Coastal Clean-up (ICC), which took place in over 60 countries worldwide, 441,493 plastic bags were found, accounting for 2% of all litter found (ICC, 2013).

Because of their lightweight nature, plastic bags are readily carried by the wind. Indeed, they often blow out of litter bins and landfill sites, following even proper disposal. When they land in rivers or the sea, however, the surface tension of the water prevents them blowing any further. Wave action then expels air from the bag and eventually they become neutrally buoyant, and float in suspension before eventually breaking up into smaller fragments and being deposited into sediments, entangling an animal, or being ingested.

In 1995, high numbers of plastic bags (more than 70% of total litter) were reported in dredge samples from the continental shelf along the French and Spanish Atlantic Coast (Galgani *et al.*, 1995). During a survey of floating marine debris conducted in the South East Pacific plastic bags far outnumbered other items at 47.6% of all items (Thiel *et al.*, 2003).

Offshore surveys of floating marine debris in the North East Atlantic carried out by the Hebridean Whale and Dolphin Trust from 2003 to 2005, found plastic bags to be the most common litter item seen at sea. In 2003, a total of 208 floating litter items were observed: 88 of these were plastic bags. In 2004, out of 209 items observed, 50 were plastic bags, and in 2005 out of 101 items observed, 34 were plastic bags. Plastic bags thus accounted for 42.3%, 23.9%, and 33.6% respectively of all floating litter observed in these surveys.

A study on the degradation of various types of plastic bags (standard, degradable and biodegradable) in the gastrointestinal fluids of Green and Loggerhead turtles showed that after 49 days the standard and degradable bags showed negligible signs of degradation. Although the biodegradable bags showed mass losses of between 3 and 9% over the same period, the authors concluded that this was so slow that morbidity could still occur (Müller *et al.*, 2011).

In December 2008, the UK Government, all four devolved administrations, the British Retail Consortium (BRC) and leading supermarkets put in place a voluntary agreement with the aim of achieving a 50% cut in the number of single-use carrier bags given out to customers by spring 2009 measured against a 2006 baseline. Unfortunately the agreement narrowly failed to reach its target of a reduction of 50% and the latest figures from WRAP have shown that single use carrier bags have increased to 8.3 billion bags in 2013. This is around a 10% increase in comparison to the 2010 levels (WRAP 2013).

A recent study from the Environment Agency found that single-use carrier bags have the smallest carbon footprint of all types of bags, but also showed that plastic 'bags for life' need only be used four or more times to have a lower carbon footprint than single-use bag. Cotton bags would need to be used about 131 times to have a lower carbon footprint. However, the report did not take into account the effects of littering of plastic bags, degradation of plastics in the marine environment, or effects on wildlife.

A spokesman for the Environment Agency also argued that the report confirmed that the high-profile campaign against single-use carrier bags was justified and had a positive effect in encouraging retailers to cut down on single-use plastic bags. "You can spin it [to show single-use plastic bags have the lowest impact], but the conclusion is that it is more sensible to use reusable bags and then reuse them," he said, adding that the report did not take account of other environmental impacts associated with single-use bags, such as litter. "Plastic bags are still a huge issue and consumer behaviour towards bags has changed positively in recent years... [the focus on bags] makes people think about other impacts and has led into the debate about packaging' (<http://www.businessgreen.com/bg/news/2028024/plastic-bag-analysis-confirms-bags-life-carbon-savings>).

The bag taxes/charges now in place in Ireland, Wales, Scotland and Northern Ireland have been extremely successful in reducing the number of single use bags being used and in the number of bags littering the environment.

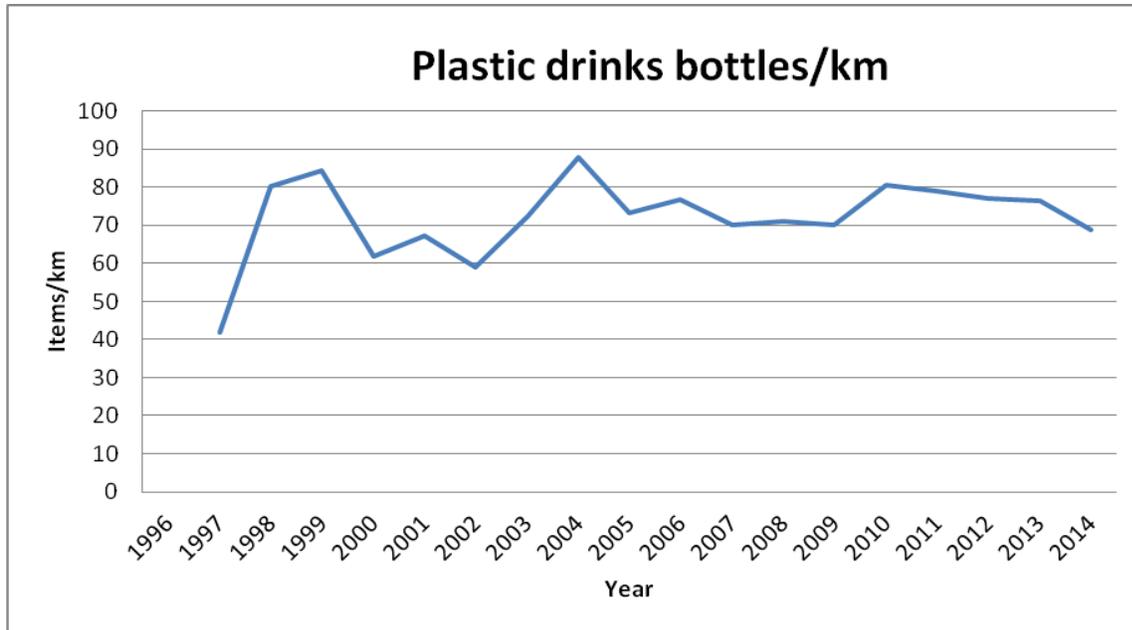
England will bring in a charge in the autumn of 2015 but unfortunately has included exemptions for small businesses (less than 250 employees) and paper and biodegradable bags. These exemptions will almost certainly mean this scheme will not be as successful as the others in the UK and cause confusion for consumers and retailers alike. Furthermore, the small business associations themselves do not want to be exempt.

#### 5.5.4 Plastic bottles

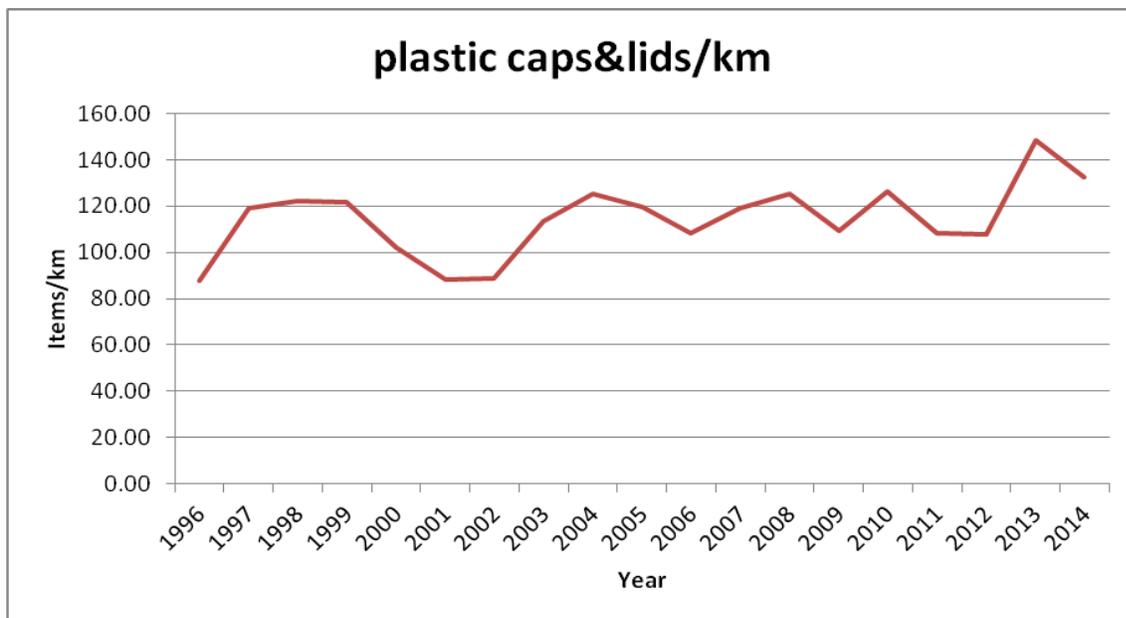
Plastic bottles and tops are a sign of our growing reliance on single use items. Owing to the resilience the plastic, they persist in the marine environment, slowly breaking down and adding to the problem of small plastic pieces and, eventually, microplastics.

Plastic bottles and their associated tops are some of the most obvious pieces of litter to be found as beach litter. During the 2014 Great British Beach Clean 7,962 drinks bottles and 14,750 caps and lids were found. Plastic drinks bottles accounted for 2.8% of all litter and had a density of 69 items/km. Caps and lids accounted for 5.4% of total litter with an average density of 132 items/km.

Recent research has highlighted the feasibility of introducing deposit or bottle refund schemes in the UK. The schemes examined were shown to bring a number of benefits including increased recycling, reduced costs, reduced littering and job creation (Hogg *et al.*, 2011; Hogg *et al.*, 2010).



**Figure 2: Plastic drinks bottles recorded per km surveyed during MCS Great British Beach Cleans 1997 – 2014.**



**Figure 3: Plastic caps/lids recorded per km surveyed during MCS Great British Beach Cleans 1996 – 2014.**

## 5.6 Oxo/photo/degradable/compostable plastics

Various different polymers and types of plastics such as oxo/photo/biodegradable/compostable plastics have been put forward as one solution to the problem of marine plastics, especially plastic bags.

However on closer inspection many of these products may not be as useful as they appear. A 2010 study by O'Brine and Thompson found that the decomposition time of oxo-biodegradable plastic was increased in sea water due to the effects of temperature and biological fouling. A further concern is that oxo/photo-biodegradable plastics merely disintegrate faster into smaller fragments and the effect of these fragments on wildlife is, as yet, unknown.

A further problem is that labelling such plastics as degradable does not encourage a change in behaviour which would be a more sustainable form of decreasing the amount of plastic in our seas, but could have the perverse effect of encouraging littering.

## 6 Discussion

Beach and marine litter would seem on the surface to be an easily preventable problem. All litter is a result of either accidental loss or deliberate littering. However, one of the main stumbling blocks to effectively preventing marine litter is that this form of pollution comes from many different sources, e.g. the public, fishing, shipping and sewerage systems.

Each of these categories of litter requires a different set of actions to be enacted in order to put appropriate controls in place. This kind of coordinated and concerted action can only really be effective if a coordinated lead is provided by the four UK administrations. Industry, retailers, and the general public must all then play a part to ensure that we can finally turn the tide on marine litter.

This approach needs all players in the chain to take responsibility:

**Responsible design** – minimal packaging, closed loop design/design for recycling, increased use of recycle in products, secure transport.

**Responsible use** – reduction, reuse, use of recycling and disposal facilities, levies, deposit systems, loan schemes, education.

**Responsible reuse/recycling** – provision of appropriate facilities for collection, recycling and disposal, facilities and systems that make it easy for the consumer to do the right thing, development of markets for recycled materials, levies, deposit systems.

**Responsible Government** – coordinated marine litter strategies between the four UK administrations, quantitative litter reduction targets, education, enforcement of existing laws, fines that really mean that the polluter pays, adherence to the precautionary principle, levies, deposit systems.

Quite simply, not enough is being done to examine the whole lifecycle of plastics from pre-production to end of life and disposal to see where savings (both of cost and to the environment) and efficiencies can be made.

This is not simply a matter for the plastics industry, but concerns us all, from the individual up to government level. In many cases solutions are neither costly nor new, but there is simply the lack of will at present, be it individual, industrial or political, to put them in motion.

Although retrieving litter once it is in the marine environment is important, it is vital that we work towards a situation of near zero discharge of litter to the marine environment. Once in the marine environment the chances of retrieval decrease and the chances of harm being caused are greatly increased.

Because of the quantities of litter already in our seas and oceans we will not realistically see a situation of zero litter on our beaches and in our sea for many years. However, we must work towards achieving near zero input of litter to the marine environment, where the majority of litter found is old 'legacy' litter rather than new litter.

## 7 Policy Decisions

### Our Policy

MCS is of the opinion that:

- Plastics in themselves are useful materials and are an essential component of everyday life.
- Too much plastic is thrown away or used in unnecessary packaging.
- Not enough goods are made of recycled plastics and there are not sufficient resources to recycle all types of plastics.
- Plastics are made from non-renewable resources and consequently much more effort needs to be made to reduce, reuse and recycle all types of plastic.
- A precautionary approach to the presence of plastic litter in the environment should be taken.
- Plastic needs to be recognised as a significant and extensive marine pollutant.
- We support efforts by all sectors to work to reduce the effects of plastics on the marine environment.

### Our 'Asks'

MCS is asking **all UK administrations** to:

- Formulate coherent marine litter strategies and action plans.
- Appoint a lead body to implement these strategies.
- Commit to having meaningful and ambitious litter targets in the Marine Strategy Framework Directive (MSFD).
- Work with signatory countries to ensure the statutory enforcement of waste reduction measures under the OSPAR and MARPOL Conventions.
- Invest in enforcement of domestic legislation covering the proper disposal and clearance of litter from terrestrial and aquatic environments.
- Properly enforce current legislation for the protection and progressive improvement of the aquatic environment, and ensure polluters pay costs that truly reflect the damage they cause, in accordance with the Environmental Liability Directive.
- Ensure that the revised Port Reception Facilities (PRF) regulations bring in a 'No Special Fee' system across Europe.
- Extend existing PRF regulations to include all fishing vessels.
- Expand national kerbside plastic recycling schemes and infrastructure.
- Expand business plastic collection and recycling schemes.

- Ensure that plastics are sent to landfill or Energy from Waste plants only after all other recycling and reuse possibilities have been undertaken.
- Introduce a drinks bottle and can deposit scheme throughout the UK.
- Introduce a charge on all single use bags in England with no exemptions for small businesses or paper and biodegradable bags
- Ensure the proper provision, and maintenance, of public litter bins.
- Fund national, community based educational campaigns to encourage the public to 'Bag It and Bin It', reducing the amount of sewage-related debris reaching the environment.
- Fund research on:
  - The ability of microplastics to adsorb toxins and to be ingested by marine wildlife.
  - The potential for these toxins to bioaccumulate up the food chain.
  - Increasing the understanding of plastic degradation times and their breakdown products.
  - Introducing a 'no blame' reporting system for reporting lost or abandoned fishing gear.
  - Introducing recycling and disposal facilities for fishing nets and lines at port and harbours.
  - The impact of liquid plastics on the marine environment.
  - The sources of ocean-borne litter through major currents and marine industries around the UK

MCS is asking the **plastics industry and manufacturers** to:

- Investigate ways of reducing the number of different plastics types on the market to simplify the recycling process.
- Undertake further investment and research into plastic recycling of all types; not just bottle grade plastic.
- Invest in infrastructure for collection and recycling of fishing net and line.
- Undertake research and investment into ways of replacing unsustainable plastic packaging with alternatives that are less harmful to the environment.
- Tighten packing, transport and shipping procedures to reduce the loss of plastic pellets to the marine environment and introduce a compulsory code of conduct for the safe handling, packaging and transportation of plastic pellets.
- Actively support product levy and deposit schemes.
- Remove solid plastic beads and particles from all personal care and household cleaning products.
- Appropriately label all bathroom and sanitary products such as wet wipes, tampons and sanitary towels,, particularly those that are made wholly or partly of plastic, as non-flushable.
- Help promote litter reduction campaigns.

MCS is asking the **water industry** to:

- Improve the management of sewerage networks and combined sewer overflows (CSOs) to reduce the discharge of untreated dilute sewage and sewage-related debris to rivers and the sea during heavy rainfall.
- Help promote campaigns such as 'Bag it and Bin it' to reduce the amount of litter at source.

MCS is asking **individuals** to:

- Reduce their use of plastic packaging, and reuse and recycle wherever possible.
- Take responsibility for safe disposal of all litter items whether at home, work or on holiday, using bins provided, and not flushing plastic products into sewerage networks.
- Lobby local and national government to put in place appropriate litter reduction schemes, e.g. proper bin provision, carrier bag levies and bottle deposit schemes.
- Support clean-up schemes to remove litter from the environment before it reaches the sea.
- Support beach clean schemes to remove litter from beaches.

## MCS's Actions

In order to make continuous progress towards achieving the asks in the previous section, MCS will develop constructive working relationships with other environmental NGOs worldwide who have shared concerns about plastics. In particular MCS will strive to:

- Identify named contacts for (i) UK administrations and (ii) industry and communicate the contents of this PPPS to them.
- Develop constructive working relationships with the plastics industry who have shared concerns about plastics.
- Actively engage, inform and influence the relevant bodies within each UK administration to ensure that the effects of marine litter and plastic in particular are sufficiently understood and that priority is given to further research particularly with regard to the effect of microplastics.
- Ensure that marine litter is given appropriate consideration by the appropriate Link organisations by highlighting its relevance to any work undertaken by these organisations.
- Actively campaign to reduce marine litter at source.

## 8 Important Note

MCS Policy and Position Statements (PPSs) are being developed in relation to the activities of the three work streams (Pollution, Fisheries and Aquaculture, and Biodiversity) of MCS's Conservation Department, and they represent MCS's views on issues at a particular point in time. It is recognised that these views may change to reflect changes in external factors (e.g. changes in the law, new evidence provided by research, changes in policy of UK administrations, etc). It should be understood, therefore, that MCS's PPSs are under constant review, and that previously held views may alter and lead to revised PPSs.

If you are in any doubt about the currency of this PPS, please contact MCS by either calling our switchboard on 01989 566017 or by writing to us at [info@mcsuk.org](mailto:info@mcsuk.org). Please remember to quote the version number and date of issue of this PPS when you contact us.

## 9 List of Acronyms

Defra	Department for Environment Food and Rural Affairs (for England)
EU	European Union
MARPOL	International Convention for the Prevention of Pollution from Ships
MCS	Marine Conservation Society
MSFD	Marine Strategy Framework Directive
NGO	Non-governmental organisation
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PPPS	Pollution Policy and Position Statement
PPS	Policy and Position Statement
PWRF	Port Waste Reception Facilities
SRD	Sewage-Related Debris
UNEP	United Nations Environment Programme
GBBC	Great British Beach Clean

## APPENDIX 1: Legislative Drivers

This section provides an overview of existing legislation and is not intended to be exhaustive.

### International Drivers

- Convention on the prevention of marine pollution by Dumping of wastes and other matters 1972
- International Convention for the Prevention of Pollution from Ships 1973 and 1978 generally known as MARPOL 73/78.

### European Union Drivers of most relevance to this PPPS include the following:

- Towards a circular economy: a zero waste programme for Europe COM(2014) 398 final
- Urban Waste-Water Treatment Directive (91/271/EEC)
- Water Framework Directive (2000/60/EC)
- Bathing Waters Directive (2006/7/EC)
- Shellfish Waters Directive (2006/113/EC)
- Port Reception Facilities (PRF) Directive (2000/59/EC)
- Marine Strategy Framework Directive (2008/56/EC)
- Waste Framework Directive (2008/98/EC)
- New Battery Directive (2006/66/EC)
- Environmental Liability Directive (2004/35/EC)
- Landfill Directive (1999/31/EC)
- The OSPAR convention - The Convention for the Protection of the marine Environment of the North-East Atlantic

### UK Drivers affecting Ocean-Based Sources include:

- The Merchant Shipping (Prevention of Pollution by Garbage) Regulations 1998.
- The Merchant Shipping (Reception Facilities for Garbage) Regulations 1997.
- Merchant Shipping (Port Waste Reception Facilities) Regulations 2003.
- Merchant Shipping (Prevention of Pollution) (Limits) Regulations 1996.
- Merchant Shipping (Ship-to-Ship Transfers) Regulations 2010 and amendments 2012.

### UK Drivers affecting Land-Based Sources include:

- Environmental Protection Act (1990).
- The Waste (England and Wales) Regulations (2011)
- The Waste (England and Wales) (Amendment) Regulations (2012)
- The Waste (Scotland) Regulations (2012)
- The Waste Regulations (Northern Ireland) (2011)

- The Dogs (Fouling of Land) Act (1996).
- The Anti Social Behaviour Act (2003).
- Local Government Act (2003).
- Clean Neighbourhoods and Environment Act (2005).
- Household Waste Recycling Act (2003).
- Producer Responsibility Obligations (Packaging Waste) Regulations (2005).
- Packaging (Essential Requirements) Regulations (2003).
- Waste Electrical and Electronic Equipment (2006).
- End-of-Life Vehicles Regulations (2003).

**Other legislation/factors affecting the types and amounts of marine litter:**

- Recycling Targets
- Waste Strategies (all UK countries)
- The Courtauld Commitment, a voluntary agreement between the Waste Resources and Action Programme (WRAP) and major UK grocery organisations to support less packaging and food waste ending up in household bins, also has the potential to affect quantities of land based litter.

## APPENDIX 2: Useful Websites

### Environmental Regulators

- Environment Agency [www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)
- Scottish Environment Protection Agency [www.sepa.org.uk](http://www.sepa.org.uk)
- Northern Ireland Environment Agency [www.doeni.gov.uk/niea/](http://www.doeni.gov.uk/niea/)

### Local Government Associations

- Local Government Association [www.lga.gov.uk](http://www.lga.gov.uk)
- The Convention of Scottish Local Authorities [www.cosla.gov.uk](http://www.cosla.gov.uk)
- Welsh Local Government Association [www.wlga.gov.uk](http://www.wlga.gov.uk)
- Northern Ireland Local Government Association [www.nilga.org](http://www.nilga.org)

### UK Administrations

- Department of Environment Food & Rural Affairs [www.defra.gov.uk](http://www.defra.gov.uk)
- Scottish Government [www.scotland.gov.uk](http://www.scotland.gov.uk)
- Welsh Government [www.wales.gov.uk](http://www.wales.gov.uk)
- Northern Ireland Executive [www.northernireland.gov.uk](http://www.northernireland.gov.uk)

### Other Useful Websites

- European Union [http://europa.eu/index\\_en.htm](http://europa.eu/index_en.htm)
- The National Archives [www.legislation.gov.uk](http://www.legislation.gov.uk)
- Wildlife and Countryside Link (for England) [www.wcl.org.uk](http://www.wcl.org.uk)
- Scottish Environment Link [www.scotlink.org](http://www.scotlink.org)
- Wales Link [www.waleslink.org](http://www.waleslink.org)
- Northern Ireland Environment Link [www.nienvironmentlink.org](http://www.nienvironmentlink.org)
- Keep Britain Tidy [www.keepbritaintidy.org](http://www.keepbritaintidy.org)
- Keep Wales Tidy [www.keepwalestidy.org](http://www.keepwalestidy.org)
- Keep Scotland Beautiful [www.ksbscotland.org.uk](http://www.ksbscotland.org.uk)
- TIDY Northern Ireland [www.tidynorthernireland.org](http://www.tidynorthernireland.org)
- Campaign for the Protection of Rural England [www.cpre.org.uk](http://www.cpre.org.uk)
- Surfers Against Sewage (SAS) [www.sas.org.uk](http://www.sas.org.uk)
- European Environment Agency [www.eea.europa.eu](http://www.eea.europa.eu)
- United Nations Environment Programme (UNEP) [www.unep.org](http://www.unep.org)

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