



OSPAR
COMMISSION

Scoping study for plastic carrier bags



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OSPAR Convention

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the “OSPAR Convention”) was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. The Contracting Parties are Belgium, Denmark, the European Union, Finland, France, Germany, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Convention OSPAR

La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. Les Parties contractantes sont l'Allemagne, la Belgique, le Danemark, l'Espagne, la Finlande, la France, l'Irlande, l'Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d'Irlande du Nord, la Suède, la Suisse et l'Union européenne

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Executive Summary

Plastic debris in the ocean represents a growing threat for marine life, tourism and for the fishing industry. The nature of these environmental impacts is global, transboundary and makes the decision making to resolve this growing problem complex, and the measures taken difficult to implement at a large scale. The ingestion of plastic by marine animals can cause a loss of economic value of seafood and a problem of safety for human health (even if the impacts are unknown). The threat to human health is also due to exposure to chemicals and to the pathogens being carried on the plastic litter. The presence of plastic in the ocean or on the beaches discourages visitors and leads to a loss of aesthetic value, attractiveness and income for the tourism industry, resulting in additional costs for clean-up.

Single use plastic bags are a product with a short lifespan rapidly ending up in waste streams and often inappropriately disposed of at their end of life. Their low weight, and resistance has led to their proliferation in the environment and especially in the marine environment. Once in the ocean, plastic bags can last for hundreds of years even after degradation because they are only fragmented and persist in the form of micro-particles.

The proportion of marine plastic debris attributed to plastic bags is high, sinking to the sea floor and also representing 80-100% of floating litter, depending on the area. It is anticipated that a high percentage of floating microplastics may also derive from plastic bags.

OSPAR's Regional Action Plan for Marine Litter (RAP ML) has been agreed for the period 2014-2021. It contains 55 actions which aim to prevent and reduce inputs of marine litter in the North-East Atlantic from both land-based and sea-based sources.

Action 44 sought to "reduce the consumption of single use plastic bags and their presence in the marine environment, supported by the development of quantifiable (sub) regional targets, where appropriate, and assist in the development of relevant EU initiatives."

This action contributes to Theme B of the RAP ML to combat land-based sources of marine pollution, in particular through the development of Incentives for responsible behaviour and/or disincentives for littering.

This scoping study draws on literature and the experience of Contracting Parties to explore the impacts of plastic bags in the environment, national measures that have been taken to reduce plastic bag pollution and the monitoring requirements to assess the impact of these measures. After the adoption of the EU Directive 2015/720 to reduce the consumption of lightweight plastic carrier bags, the scoping document also collates evaluation and experiences of its implementation in OSPAR Contracting Parties.

Récapitulatif

Les débris de plastique dans l'océan représentent une menace croissante pour la vie marine, le tourisme et l'industrie de la pêche. La nature de ces impacts environnementaux est mondiale et transfrontalière, ce qui rend complexe la prise de décision pour résoudre ce problème croissant, et les mesures prises difficiles à mettre en œuvre à grande échelle. L'ingestion de plastique par les animaux marins peut entraîner une perte de valeur économique des produits de la mer et un problème de sécurité pour la santé humaine (même si les impacts sont inconnus). La menace pour la santé humaine est également due à l'exposition aux produits chimiques et aux agents pathogènes transportés par les déchets plastiques. La présence de plastique dans l'océan ou sur les plages décourage les visiteurs et entraîne une perte de valeur esthétique, d'attractivité et de revenus pour l'industrie du tourisme, ce qui entraîne des coûts supplémentaires pour le nettoyage.

Les sacs plastiques à usage unique sont des produits à courte durée de vie qui se retrouvent rapidement dans les flux de déchets et sont souvent éliminés de manière inappropriée à la fin de leur vie. Leur faible poids et leur résistance ont conduit à leur prolifération dans l'environnement et notamment dans l'environnement marin. Une fois dans

l'océan, les sacs plastiques peuvent durer des centaines d'années, même après dégradation, car ils ne sont que fragmentés et persistent sous forme de microparticules.

La proportion de débris plastiques marins attribuée aux sacs plastiques est élevée, ils coulent au fond de la mer et représentent également 80 à 100 % des déchets flottants, selon la zone. Il est prévu qu'un pourcentage élevé de microplastiques flottants puisse également provenir de sacs plastiques.

Le Plan d'action régional d'OSPAR pour les déchets marins (RAP ML) couvre la période de 2014 à 2021. Il comporte 55 actions visant à prévenir et réduire les apports de déchets marins dans l'Atlantique du Nord-Est, qu'ils soient d'origine terrestre ou marine.

L'Action 44 cherche à « Réduire la consommation de sacs plastiques jetables et leur présence dans le milieu marin, en développant des cibles (sous) régionales quantifiables, le cas échéant, et en prenant part au développement d'initiatives pertinentes de l'UE ».

Cette action contribue au Thème B du RAP ML : Actions de lutte contre les déchets marins d'origine tellurique, notamment par la mise en place d'incitations pour un comportement responsable et/ou dissuasions pour l'abandon des déchets.

Le présent document s'appuie sur la littérature et l'expérience des Parties contractantes pour explorer les impacts des sacs plastiques sur l'environnement, les mesures nationales qui ont été prises pour réduire la pollution par les sacs plastiques et les exigences de surveillance pour évaluer l'impact de ces mesures. À la suite de l'adoption de la Directive 2015/720 de l'UE en ce qui concerne la réduction de la consommation de sacs en plastique légers, le présent document rassemble également les évaluations et les expériences de sa mise en œuvre par les Parties contractantes.

1 Introduction

Plastics have become indispensable in our modern societies benefiting economic and social development. Plastics are used in every sector of activity from the food industry to health, transportation and enhancing the digital age. However, despite its high utility and our capacity to design with it, the use of plastics presents significant economic, social and ecological costs. Currently, plastics can be found in every ocean and every shoreline of the world. They are now ubiquitous in the ocean. Known for its durability, plastic persists in the ocean a long time. Our unsustainable use of plastics has resulted in large quantities of plastic in the ocean, despite efforts to reduce consumption of plastic and to make its use more responsible and less damaging. Each year, it is estimated that between 6 and 10 percent of the increasing plastic production of the world ends up as marine litter, equivalent to 3,4 to 5,7 million tons in Europe¹.

With its transboundary nature, the marine litter problem is a global concern. Among all marine debris found in the Atlantic Ocean and in all the oceans and seas of the world, plastic bags are among the most present in the environment. With its resistance to degradation; the presence of plastic bags in the environment is ecologically, economically and socially harmful.

Marine plastic debris was analyzed as an issue of particular concern by the second session of the United Nations Environment Assembly (UNEA 2) in 2015. The same year, the UN elaborated 17 Sustainable Development Goals. The plastic debris problem can be related to 4 of these goals: Goal 6 “ensure availability and sustainable management of water and sanitation for all”, Goal 11 “make cities and human settlements inclusive, safe, resilient and sustainable”, Goal 12 “ensure sustainable consumption and production patterns”, Goal 14 “conserve and sustainably use the oceans, seas and marine resources for sustainable development”.

The United Nations Convention on the Law of the Sea (UNCLOS) provides the overarching framework, within which all the activities in the oceans and the seas must be carried out. Part XXII of UNCLOS deals with «Protection and preservation of the marine environment» and requires States to take, “*individually or jointly, as appropriate, all measures consistent with UNCLOS which are necessary to prevent, reduce and control pollution of the marine environment from any source*” (Article 194 §1), including plastic pollution.

The OSPAR maritime area covers the north-east region of the Atlantic Ocean as shown in figure 1.



Figure 1 : Map of the area concerned by the OSPAR Convention

Source : *Ospar Commission Website*

2 Background information on plastic bags: production and use

2.1 Different types of single use carrier bags

The majority of carrier bags used around the world today are made of plastic, but several types of carrier bags exist:

- **Plastic carrier bags:** We can find plastic carrier bags that contain 70% less plastic as compared with 20 years ago². They are mainly made of Polyethylene (PE), a molecule derived from non-renewable oil. Moreover, the fabrication of plastic bags requires energy to manufacture. Lightweight plastic carrier bags are plastic bags with a thickness below 50 microns, while very lightweight carrier bags have a thickness of below 15 microns; they are used for hygiene purposes or provided as primary packaging for loose food to help prevent food wastage³.
- **Degradable PE carrier bags:** also known as oxo-degradable, oxo-biodegradable or UV-degradable. These bags are made from oil-derived PE and additives that act as catalysts to accelerate the degradation process. These additives break down under UV exposure, oxygen, heat and/or mechanical stress resulting in small particles of plastic. These bags may potentially be biodegradable turning the bag into water, carbon dioxide, biomass and trace elements, but the process takes several years to be accomplished. These bags are not compostable and are not recognised by the EU legislation as biodegradable bags.
- **Bio-based carrier bags:** this type of bag is weaker than conventional carrier bags for the same amount of material. They are made from renewable crop-derived sources and are designed to biodegrade in aerobic industrial composting conditions but not in landfill conditions. These bags may be compostable in home composting conditions. In landfills, they degrade and release methane.
- **Paper bags:** are biodegradable, compostable, recyclable and made from renewable sources but they require more energy to manufacture. In landfills, they degrade and release methane.
- **Bags made from natural materials other than bio-based plastic bags:** the plants used need water, fertiliser and energy to harvest and to process into bags. This type of bags encourages re-use and they can be reprocessed at the end of their life.

² Wrap Website

³ European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste (OJ L 365, 31.12.1994, p. 10–23), which provides measures to reduce the consumption of lightweight plastic carrier bags

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2.2 Production, importation and consumption of single-use plastic carrier bags

After its first appearance in shops at the end of the 1950s, the plastic bag has become a popular and convenient product, utilised all around the planet. However, this growing consumption shows several negative impacts, both environmental and socio-economic. These effects have triggered a strong interest and a growing concern among the public and policy makers.

In 2014, the total production of plastic in the world was estimated at 311 million tons⁴, with the highest proportion originating from one of the four main regions of plastic production: China, Asia (excluding China), Europe and North America. One tenth of all produced plastic ends up in the ocean. Among the many plastic products we can find nowadays, single or multiple-use plastic bags are very convenient products, widely used to carry shopping items. According to the Environmental Protection Agency, between 500 and 1000 billion plastic bags are used each year across the world. In France, the consumption of single-use plastic carrier bags was estimated to be 17 billions per year⁵ in 2014. Despite the reduction in use in recent years, consumption remains too high. The “success” of this item is partially due to the low cost of production, where the fabrication of one plastic bags costs approximately \$0,01⁶.

According to the 2012 Eunomia study, in the European Union, there are 250 to 300 producers of plastic bags, representing a total of 15 000 to 20 000 employees. Despite the importance of Europe in terms of production of plastic bags, a large part of these bags utilised in EU are imported: it is estimated that 30% of all plastic bags are imported (mainly from Asia) and 70% of single-use plastic carrier bags. The production of plastic bags is so important that it is estimated that one plastic bag is produced every second.

Table 1: Breakdown of EU plastic carrier bag production and importation (Source: Eunomia and BIO IS, 2012)

	EU Production (Tonnes)	Imported bags (Tonnes)	EU Production (%)	Imported bags (%)
Single-use non-biodegradable	239 250	522 500	32	98
Single-use biodegradable	10 831			
Multiple-use	873 993	238 081	79	21
Total plastic carrier bags	1 124 074	760 581		

In 2013, each citizen of the European Union utilised 198 bags per year, 90% being single-use plastic carrier bags⁷. On average, each plastic bags was utilised for only 20 minutes⁸. In 2010, 98,6 billion plastic bags were introduced in the EU market.

Table 2: Weight and number of plastic carrier bags consumed in EU-27 by type, 2010 (Source: Eunomia and BIO IS, 2010)

	Weight (Mt)	Number of bags (billions)	Share (% of total number)	Bags per capita
Single-use non-biodegradable	0,73	85,3	87	171
Single-use biodegradable	0,02	2,3	2	5
Multiple-use	0,87	11	11	22

4 Plastics Europe, 2015

5 French Ministry of Environment, Energy and Sea website, 2016

6 Report of the extraordinary session of 2013-2014 n°694 of the French Senate

7 European Commission Staff Working Document, 2013

8 Report of the extraordinary session of 2013-2014 n°694 of the French Senate

Total plastic carrier bags	1,61	98,6	100	198
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There are differences between EU countries in terms of consumption of plastic bags. While Danish and Finish citizens consume on average less than 10 single-use plastic bags per year, Cypriot, Hungarian, Polish, Slovak and Slovenian citizens consume more than 450 single-use plastic bags per year⁹.

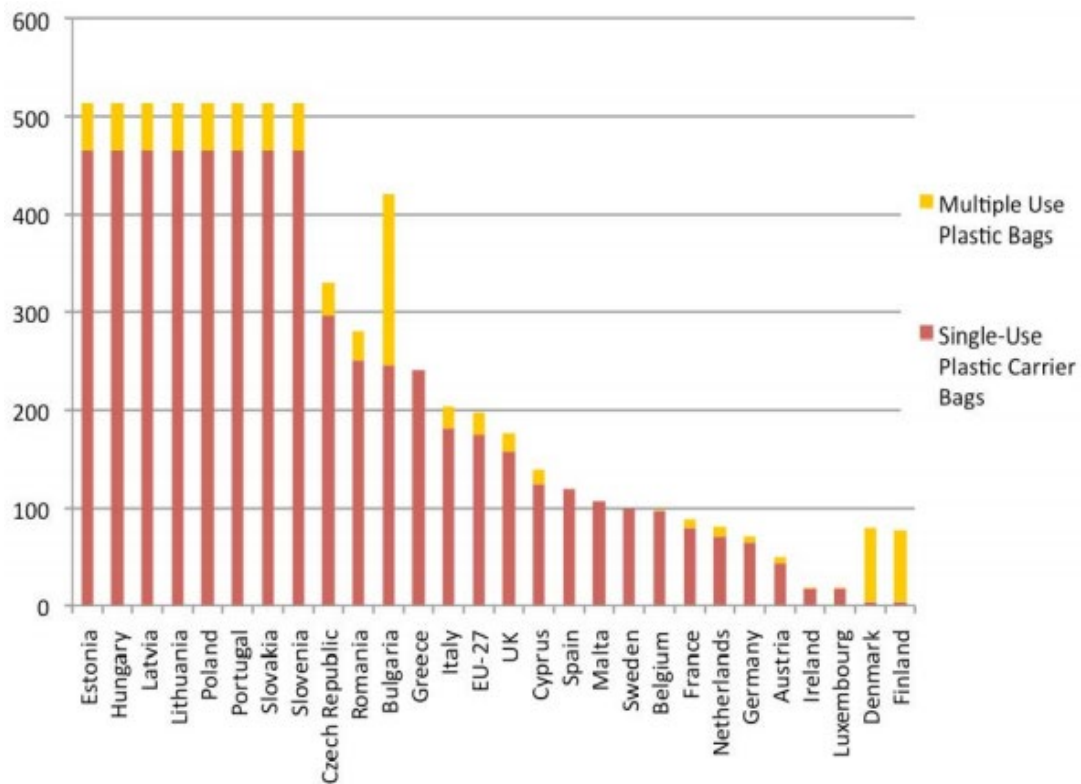


Figure 2: Plastic bag use in the European Union in 2010 (number of plastic bags used per citizen per year).Source: Website of the EU news Euractive

The countries with the lowest rates of consumption are usually countries where retailers do not give plastic bags for free. On the other hand, there are no specific measures or non-effective measures concerning plastic bags in the countries with the highest rates of consumption¹⁰.

2.3 Recycling of plastic bags

Less than 1% of plastic bags are recycled in the world. This is because the recycling cost of a plastic bag is higher than the production cost¹¹. In the EU, 6,6%¹¹ of all plastic bags are recycled, the remainder are used for energy recovery (39%) or are landfilled (49,7%)¹².

Recycling of plastic bags depends on the type of plastic the bag is made of. When recycled, it is often turned into another bag. The recycling process is the same for plastic bags than for all other plastics materials.

9 Euractive Website

10 Euractive Website

11 Report of the extraordinary session of 2013-2014 n°694 of the French Senate

12 European Commission Staff Working Document, 2013

3 PRESENCE OF PLASTIC BAGS IN THE ENVIRONMENT

It is estimated that the number of plastic and paper bags found as marine litter almost reaches 10 million items, which represents 9,4% of the total marine litter¹³. In the European Union, approximately 8 billion plastic bags were thrown away into nature in 2010, which represents 16 bags per citizen and 8% of the plastic bags used in Europe¹⁴. Plastics represent 70% of the marine litter in the European seas¹⁵.

Table 3: Number of plastic carrier bags used and littered in EU27, 2010/2020. *Source: Eunomia, 2012*

	Total bags used (billions)		Bags used per person		Bags littered (billions)	
	2010	2020	2010	2020	2010	2020
Single-use plastic bags	87,6	98,7	176	194	5,7	6,31
<i>Single-use : non-biodegradable</i>	85,3	92,2	171	181	5,7	6,3
<i>Single-use : biodegradable</i>	2,3	6,5	5	13	0	0,01
Multiple-use	11	11,8	22	23	2,3	2,3
Total	98,6	110,5	198	217	8,03	8,61

The degradation of plastic bags in the natural environment can be up to 400 years, particularly in the marine environment where it can stay for decades without being degraded. Indeed, in the ocean, the water keeps the temperature of the plastic low and algae blocks the actions of UV light. These factors slow down the process of degradation of plastic bags¹⁶.

According to the Research Triangle Institute, all plastic debris produced during the last 50 years that has ended up in the ocean, is still in the ocean today and, according to another study of the Superior Scientific Research Center (CSIC) of Cádiz University, published 30 June 2014 in the USA in the PNAS, plastic debris pollutes almost 88% of the ocean surface. Five convergence areas are particularly affected by these floating plastic debris, located at the level of the oceanic gyres (areas of forces balance, convergence areas): North East Pacific, South East Pacific, North West Atlantic, South Atlantic and Indian Ocean. The study estimates that the quantities of plastic debris floating on the ocean are 7000 to 35000 tons (33-35% of these are located in the north pacific, this area is also called the "Great Pacific Garbage Patch" or the "7th continent").

¹³ marinelittersolutions.com

¹⁴ Eunomia, 2010

¹⁵ Galgani, F. *et al.*, 2000. Litter on the sea floor along European Coasts. *Marine Pollution Bulletin*, 40(6).

¹⁶ Report of the extraordinary session of 2013-2014 n°694 of the French Senat

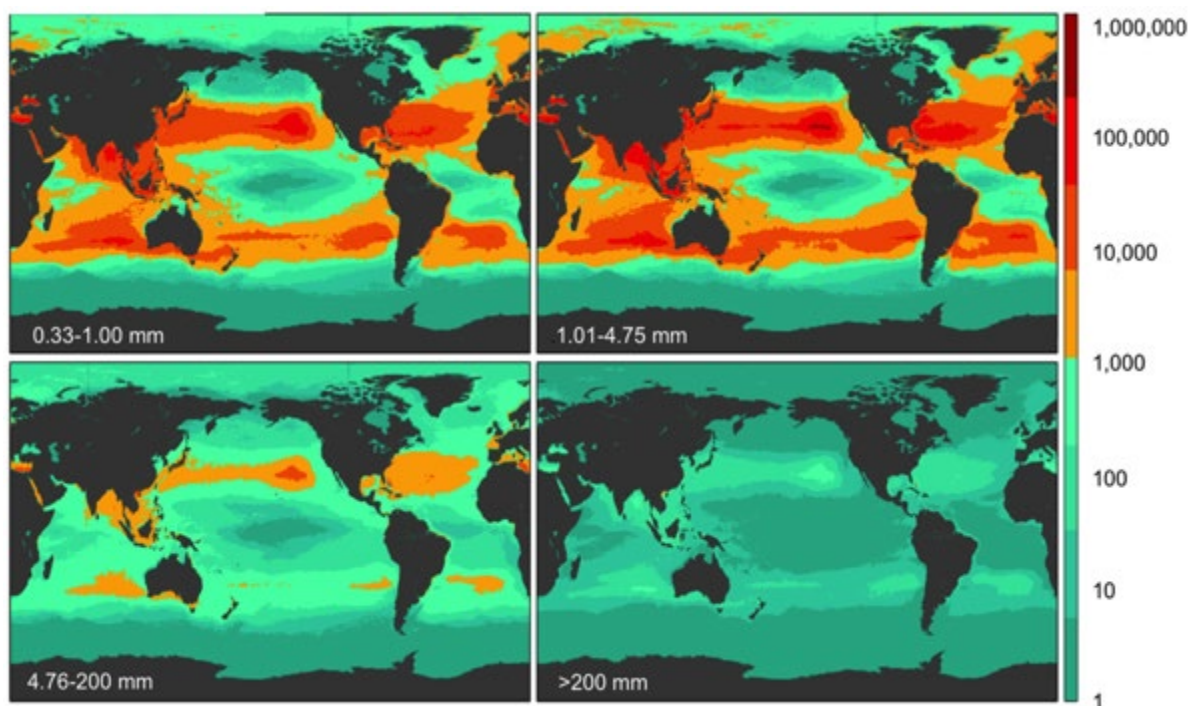


Figure 3: Location of garbage patches of the different sizes of floating plastics as a consequence of marine currents. (Source: Eriksen M., Lebreton L., Carson H., Thiel M., Moore C., Borroero J., Galgani F., Ryan P., Reisser J., 2014)

The 2000 study of Galgani *et al.* put into relief the repartition of plastic debris on the seabed in the OSPAR region but was not specific to plastic bags and did not concern floating plastic debris.

The distribution and abundance of marine litter on the seafloor off the United Kingdom's (UK) coasts were quantified during 39 independent scientific surveys conducted between 1992 and 2017. Widespread distribution of litter items, especially plastics, were found on the seabed of the North Sea, English Channel, Celtic Sea and Irish Sea. High variation in abundance of litter items, ranging from 0 to 1835 pieces per km² of seafloor, was observed. Plastic items such as bags, bottles and fishing related debris were commonly observed across all areas. Over the entire 25-year period (1992–2017), 63% of the 2461 trawls contained at least one plastic litter item. There was no significant temporal trend in the percentage of trawls containing any or total plastic litter items across the long-term datasets. Statistically significant trends, however, were observed in specific plastic litter categories only. These trends were all positive except for a negative trend in plastic bags in the Greater North Sea - suggesting that behavioural and legislative changes could reduce the problem of marine litter within decades¹⁷.

The 2018 OSPAR Assessment on beach litter monitoring describes the abundance and composition of beach litter in the OSPAR Maritime Area in the six-year reporting period April 2012 to January 2017, and trends in the abundance of litter for the period December 2009 to January 2018. Small and large plastic bags each were among the top litter items on 19% of 24 survey coastal sites between 2009 and 2018.

The European Commission's JRC report on top marine litter items shows that plastic bags and similar items appear to be the 10th most frequent litter in 2016 on the scale of the EU coastline.

However, there are regional differences. Indeed, plastic bags and similar items appear in the Top 10 litter items in the Baltic, Black Sea and Mediterranean areas but not in the Top 10 in the North-East Atlantic.

As part of the next OSPAR Quality Status Report results will be included from the work of the Beach litter Expert Group. For the period 2018-2020 and for the whole OSPAR area, the results show that plastic bags and similar items (including the categories Bags [2], Small bags [3] and Bag ends [112]) represent only a small percentage of the litter found on the coast (1.08% of total litter excluding plastic fragments <2.5 cm) and they only occupy 14th place in the ranking of the most found litter.

¹⁷ "Below the surface: Twenty-five years of seafloor litter monitoring in coastal seas of North West Europe (1992–2017)", T.Maes, J. Barrya, H.A.Leslie, A.D.Vethaakb, E.E.M.Nicolaus, R.J.Lawad, B.P.Lyons, R.Martinez, B.Harley, J.E.Thain, Science of The Total Environment, Volume 630, 2018.

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Map: Map of the Week – Beach Litter – Plastic Bags. *Source: EMODnet.*

In conclusion, on the coast of the OSPAR maritime area, plastic bags and similar items are present but not very abundant compared to other litter. This does not necessarily mean that plastic bags pollution of the marine environment is low. Indeed, one hypothesis could be that plastic bags probably have a complex behavior (sub-floating or sinking, indeed they are found on the seabed) that could affect their propensity to run aground on the coast.

4 IMPACTS OF THE PRESENCE OF PLASTIC BAGS IN THE ENVIRONMENT

4.1 Environmental impacts

The environmental damages of plastic waste in the ocean are estimated by the ONU at 9,5 billion €. The nature of these environmental impacts is global and transboundary. This makes the decision-making to resolve this growing problem complex and the measures taken difficult to implement at a large scale.

4.1.1 Inefficient use of resources

The use of plastic bags contributes to the depletion of natural resources and the increase of waste. The short lifespan of this kind of plastic product results in it rapidly ending up in waste streams. The often-inappropriate disposal and end-of-life treatments increase the presence of these plastic bags in the environment. Although a very small proportion of plastic bags used are recycled, a part of the energy embedded in the fabrication of plastic bags is lost. The growing exportation of plastic wastes outside the EU for treatment leads to a loss of raw material from the EU and consequently a growing dependency on other producers (Asia mainly).

4.1.2 Littering and its impacts

Plastic bags are not biodegradable, they are photo degradable. The low weight and the resistance of this product leads to their proliferation in the environment and especially in the marine environment. Once in the ocean, plastic bags can last for hundreds of years even after degradation, because they are only fragmented and persist in form of micro-particles.

It is estimated that 8 billion plastic bags were littered in 2010 with a large majority of these being single-use plastic carrier bags and corresponding to 8% of consumption.

Because of the global nature of the problem, there is no comprehensive overview covering the EU but it is known that a large accumulation of plastic debris can be found in the EU seas and seabeds. The proportion of marine plastic debris attributed to plastic bags may reach a high level for large debris, with percentages reaching 35-50% on the sea floor and up to 80-100% for floating litter, depending on the areas. The study of floating litter and sea floor litter aims to determine the spatial distribution, quantities, nature, sources and areas of accumulation of such litter. Without any systematic studies, we may expect that a high percentage of floating microplastics may also derive from plastic bags.

In the marine environment, plastic bags are mistaken for food by animals. This causes entanglement or ingestion, leading to severe injuries or death. In total, 267 species are concerned by this issue, 100% of sea turtle species, 44% of seabird species and 43% of marine mammal species¹⁸. Studies have been undertaken to determine the rates of ingestion of plastic debris and it was estimated that the stomachs of 94% of all birds in the North Sea contain plastic¹⁹ and stomachs of 35% of fish in the North Pacific²⁰. Plastic has also been found in endangered species.

As reviewed recently²¹, marine turtles are the group of marine organisms most at risk from ingesting plastic and other anthropogenic debris since marine litter can be mistaken for food mainly because of their foraging strategy, which is characterized by highly opportunistic behaviour. Among most hard-shelled turtles (Cheloniidae), both the young, pelagic age classes and old specimens, feeding on benthos, are more likely to ingest debris and they are susceptible to both intestinal blockage and reduced food intake when they eat large amounts of plastic. Also, even at low ingestion rates marine litter is reported to have sub-lethal effects on sea turtles such as dietary dilution with consequent nutrient absorption reduction, and toxin uptake affecting growth rates, fecundity and survival. There have been many records of loggerhead turtles ingesting plastic from around the world. In Europe, this species, *Caretta caretta*, is the most common sea turtles. It is an endangered species (IUCN red list) and litter ingestion has been well documented.

In the context of the OSPAR RAP, evaluating and understanding the impacts of plastic bags and sheets on marine organisms in the Atlantic Ocean are necessary to adequately evaluate the Good Environmental Status and to follow the efficiency of reduction measures. Results from stranded organisms in European waters are available²² and studies based on risk assessment, identifying areas where turtles are likely to interact with debris²³ have shown the relevance

18 Derraik, 2002

19 Van Franeker. and S.N.S. Fulmar Study Group, 2008

20 Boeger *et al.*, 2010

21 Ryan *et al.*, 2016

22 Nelms *et al.*, 2015

23 Darmon *et al.*, 2016

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of this approach to monitor impacts of plastic items, including plastic bags and their degraded products within the MSFD.

Plastic debris in the ocean is not only a threat for the animals but for entire ecosystems with the inhibition of gas exchange between water and sediments and habitat damage. Plastic bags are fragmented in the ocean to micro-particles of plastic. Investigations on the breakdown of various types of plastics demonstrated that compostable plastic disappeared in between 16 and 24 weeks whereas approximately 98% of the other plastics (standard polymers such as polyethylene) remained after 40 weeks²⁴. As a consequence, plastic can be found everywhere. They can also be used as rafts for species that may become invasive in new ecosystems that they are brought into.

Plastic contains chemicals with some of them potentially toxic. If the levels found in the marine environment are low, the transfer of intrinsic chemicals and toxic substances into ecosystems could be a threat for animals and human health. When plastic particles seem to be excreted from organisms, chemicals may pass through the food chain and may end up in humans.

4.2 Socio-economic impacts

Plastic debris in the ocean represents a growing threat for marine life, tourism and for the fishing industry. The ingestion of plastic by marine animals can cause a loss of economic value of seafood and a problem of safety for human health (even if the impacts are unknown). The threat on human health is also due to exposure to chemicals and to the pathogens being carried on the plastic litter.

The presence of plastic in the ocean or on the beaches discourages visitors and lead to a loss of aesthetic value, attractiveness and income for the tourism industry.

To keep the attractiveness of coasts, litter clean-up activities are necessary and lead to additional costs.

5 National measures and initiatives to reduce plastic bags pollution

5.1 Baseline scenario

The baseline scenario developed in the Impact Assessment of the European Commission predicts a rise of the number of plastic carrier bags placed on the market, in consequence with the rise of the population. The share of single-use plastic carrier bags remains stable while the EU production increases. However, the use of biodegradable bags and the recycling rates increase while the incineration and landfilling of plastic bags decrease. Concerning the presence in the environment, the number of plastic bags ending up as litter remains constant but considering the degradation time of these items, the absolute number of plastic bags littered grows causing an accumulation in the environment and a slow reduction of the size of the particles. The costs of retailers to provide free plastic carrier bags increase.

This baseline scenario demonstrates the importance of taking action. The EU Commission proposed four options of measures for member states to reduce their consumption of single-use plastic carrier bags. The principal objective of these proposed measures was to limit the negative impacts on the environment of plastic bags by reducing the amount of single-use plastic carrier bags per capita. The plastic bag pollution is a common and transboundary problem to take in a coordinated and coherent way in the EU and in Europe. Each of the proposed options are already in application in some countries and have already shown results.

5.2 DESCRIPTION OF THE policy OPTIONS PROPOSED IN THE EU COMMISSION IMPACT ASSESSMENT

As cited above, the EU Commission impact assessment concerning single-use plastic carrier bags considered 4 options:

- Option 1: «Business-as-usual» («baseline scenario») where no specific EU actions are taken to reduce the use of plastic carrier bags. This option corresponds to the baseline scenario described above.

- Option 2: A voluntary commitment of a significant share of the EU retail sector not to provide single-use plastic carrier bags.

This option predicts:

- a 55% reduction of total amount of single-use plastic carrier bags by 2015
- a 13% reduction of plastic used to make plastic bags by 2020
- a 46% decrease of use of plastic carrier bags,

The choice of a voluntary agreement would permit savings through the reduced use of oil, GHG emissions and number of plastic bags littered. Despite being reduced for single-use plastic bags producers, the profits would increase for the producers of alternatives. The total savings are estimated at 478 million € per year for retailers (except if they provide free paper bags) but a reduction in employment for producers is to be expected. A voluntary agreement not to provide free single-use plastic carrier bags entails an increase of public awareness, necessary for the measure to be efficient. The administrative burden would be minimal.

Such voluntary agreements already exist in some countries. These commitments often include charges for consumers, awareness campaigns to promote a more sustainable use of plastic bags or promotion of the use of biodegradable bags or multiple-use bags. In The Netherlands for example, most types of plastic bags are not given for free anymore in the retail sector thanks to a voluntary agreement signed in 1995. Similar agreements exist in Germany, Belgium, Spain or in Sweden.

- Option 3: Setting an EU level prevention target for single-use plastic carrier bags combined with economic instruments.

This option predicts:

- an 80% reduction of number of single-use plastic bags
- a 70% reduction for all plastic bags

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The choice of a prevention target combined with economic instruments would permit savings through the reduced use of oil, GHG emissions and number of plastic bags littered. The administrative burden and costs depend on the measure applied. Costs linked to monitoring, enforcement, EU level ensuring the achievement of targets are not insignificant. Despite being reduced for single-use plastic bags producers, the profits would increase for alternatives producers. The global savings are estimated at 650 million € (for retailers) but a reduction in employment for producers is to be expected. A prevention target combined with economic instruments entails a rise of public awareness, necessary for an efficient measure

This option was chosen by several countries and often include a tax on consumers. For example, the Irish government introduced a levy on the purchase of carrier bags (not only plastic bags) in 2002. This tax is paid by the consumer into an environmental fund, which is used to finance recycling centers and other environmental activities such as cleaning up illegal landfill sites. Other countries implemented such measures such as Denmark (since 1993), Spain or more recently Portugal and the UK. Since 2015, in Portugal the light plastic bags are taxed.

- Option 4: Introducing an EU wide ban of single-use plastic carrier bags

This option predicts:

- a 100% reduction in number of single-use plastic carrier bags
- an 85% reduction in the total number of plastic bags

The choice of a ban would permit savings through the reduced use of oil, GHG emissions and number of plastic bags littered. However, the administrative burden would significantly increase (enforcement, compliance checks etc.). The rise in the profits of producers of alternatives would be a consequence of the drastic decline in single use plastic carrier bags producers profits, combined with a decrease in employment. A shift is possible to produce alternatives, but the necessary equipment and training costs are not insignificant. The combined savings are estimated at 792 million € per year. A ban entails an increase in public awareness.

The ban on plastic bags is not an often-chosen option. Only Wallonia and France have implemented such a measure. In France, the ban on single-use plastic carrier bags officially began the 1st of July 2016. Denmark has introduced a ban on thin plastic carrier bags (15<x<30 micrometer) from January 1, 2021.

All the options (except for the option 1) predicts an initial increased cost for consumers but significant global savings.

5.3 Comparison of the different policy options

The different options are compared in the table below. It is based on several indicators:

- The environmental, social and economic impacts
- The flexibility for member states to adapt the measure to their situation
- The costs of implementation
- The possibility to generate revenues
- The public acceptance of the measures
- The awareness-raising on sustainable consumption.

Table 4: Comparison of the different options. *Source: EU Commission Impact Assessment*

Impact indicator	Baseline	Retailers' voluntary agreement	Prevention target	Ban
Environmental	--	+	++	++
Economic	--	+	++	++

Social (employment)	+	-	-	-
Flexibility to MS	--	--	++	--
Implementation	0	~	-	--
Funds generation				
<i>For public authorities</i>	0	0	++	+
<i>For retailers</i>	0	+	++	+
Acceptance of the measure	--	-	++	-
Awareness raising on sustainable consumption	--	+	++	+

The baseline scenario is not profitable in any of these indicators except for the social impacts (employment). The prevention target combined with economic instruments seems to be the more profitable option even if it presents high implementation costs and a decrease in employment. A ban offers no flexibility for member state as well as high implementation costs.

In conclusion of this theoretical comparison, the prevention target combined with economic instruments seems to be the most adapted for a real reduction of plastic carrier bags. The results in the countries that have already implemented such measures are positive and encouraging.

Considering large differences between the consumption levels across European countries, it would be difficult to design and implement a Europe-wide target. It seems to be a better option to let each country set its own target with the obligation to reduce consumption.

The concrete examples of implementation of measures aiming a reduction of the use of plastic bags reveal an obvious efficiency of the reduction target accompanied by economic instruments such as taxes. Ireland presents the most convincing results. After a levy implemented in 2002, a 90% reduction of the use of plastic carrier bags was achieved within five months. The average number of thin plastic bags used per person decreased from 328 bags per person per year in 2002 to 21. The combination of a tax and a voluntary agreement showed similar results in the Netherlands.

6 Relevance of reduction targets

In order to reduce the quantity of plastic bags in the environment and its impacts on marine ecosystems, a restriction in the consumption of these bags is necessary, accompanied by a definition of precise reduction targets and a thorough monitoring of the seas and oceans state.

6.1 Reduction target of the number of plastic bags in the environment

In the 2014 Arcadis report, different possible reduction targets were assessed. The determination of the most relevant target is based on:

- The targets already in use at the level of Member States or regional seas
- The expectations of the general public and the stakeholders concerning an effective marine litter policy
- The analysed occurrence of key marine litter types, loopholes and pathways retrieved from 343 recent beach screenings in the four regional seas
- The modelled impact on marine litter of the different policy options included in the impact assessment study on the Commission's proposal for reviewing the European waste management targets
- The assessed impact on marine litter that dedicated policy measures for specific litter items can have

The most adapted option forecasts a 30 % reduction of the number of the top ten litter categories found as coast litter in each regional sea between 2015 and 2020.

About plastic bags in particular, those appear in the top ten marine litter items in the Baltic and North Sea (also in the Mediterranean Sea but it is not included in OSPAR). The 2014 Arcadis report (based on OSPAR data) suggests a 30% reduction target for the top 10 litter items found in each region by 2020. Plastic bags are evaluated in this report as a top 10 litter item for the Baltic and the North Sea beaches. This reduction target corresponds to a 13% reduction for plastic bags in the North Sea and a 13% reduction in the Baltic Sea. However, this reduction target may seem optimistic in some areas considering the transboundary nature of the marine litter problem. Indeed, another countries' litter can pollute a country with a low use of plastic bags. This highlights the necessity of an EU level reduction. Furthermore, plastic bags are among the most plentiful debris in the marine environment and, for technical reasons, the recycling is not well developed. For these reasons, a 20 % reduction target from now until 2025-2030 seems more reasonable. Even if the 30% reduction target concluded in the report has been lowered, the definition of a reference year suggested in this report would complete the target. A 20% reduction target between 2015 and 2025-2030 seems to be the most relevant target.

This 20 % reduction target for the number of plastic bags found in the marine environment needs to be accompanied by tangible measures aiming to reduce the use of plastic bags and/or better handling of waste and reducing littering.

6.2 Reduction of the use of plastic bags

6.2.1 Reduction target

The 2015 European Union law²⁵ fixed some reduction targets for the use of plastic bags within its Member States (MS). MS are required to reduce the use of lightweight plastic carrier bags at 90 bags per person per year in 2019 followed by 40 bags per person per year in 2025 or make sure that lightweight plastic carrier bags are not provided free of charge at the point of sale. This law leaves Member States the choice to take on measures they estimate the most appropriate to their situation. According to preliminary results, the 2025 target has already been reached by

²⁵ Directive (EU) 2015/720 of the European Parliament and of the Council of 29 April 2015 amending Directive 94/62/EC as regards reducing the consumption of lightweight plastic carrier bags (Text with EEA relevance)

OJ L 115, 6.5.2015, p. 11–15

some countries (Ireland, Luxembourg), while others still have a long way to go to reach the threshold fixed by the EU. Between 2015 and 2018 in Portugal, there was a gradual reduction in the number of lightweight plastic bags introduced for consumption (with the exception of those used in donations), as well as SPL shipped/exported. In 2018, the per capita consumption of SPL in Portugal was 5,9 bags / inhabitants. Several measures and initiatives have been adopted in European countries in recent years to transpose the Directive 2015/720 on plastic carrier bags. For a long-term, consistent impact, it would be relevant for non-EU countries (Iceland, Norway, Switzerland) to adopt the same reduction targets for the use of plastic bags.

6.2.2 Measures

Among the four options considered in the Impact Assessment of the European Commission to reduce the use of plastic bags, the option offering the best results is a combination of reduction targets and economic instruments. This is the option adopted by most of the European Countries. The cited economic instruments are chosen in accordance with the ongoing situation in the country considered. It can be charges for producers, for retailers or directly for consumers. In some countries such as the Netherlands, a combination of a levy on plastic bags and voluntary agreements in the retail sectors presented encouraging results.

In 2018/2019, in Portugal, Circular Agreements were signed for the efficient use of plastic in the value chain, with some Sector Associations (beverages: spring water, non-alcoholic refreshing drinks, food and catering and deliveries companies). Under the Agreements, a commitment was made to achieve by 2025. In Denmark there has for decades been a deposit scheme for beverage bottles with more than 90% recovery of bottles of plastic or glass.

- A PET bottle collection rate of 90%; and
- An incorporation fee of 25% recycled PET in new bottles.

During this period some laws were published, example given:

- Implementation of a system of incentives to the final consumer, in the form of a pilot project for the return of non-reusable plastic beverage packaging. After January 2022 will be mandatory the existence of a deposit system for packaging of non-reusable drinks in plastic, glass, ferrous metals and aluminium.
- The non-use and non-availability of single-use plastic crockery in all establishments and other non-sedentary locations and activities in the catering sector and / or beverages and retail trade.
- The obligation to provide alternatives to the use of ultralight plastic bags and plastic cuvettes at the points of sale of bread, fruits and vegetables.

7 Necessary monitoring to assess the efficiency of measures: a monitoring indicator proposal on marine turtles

A monitoring programme is necessary to assess reduction of the number of plastic bags in the marine environment and consequently the efficiency of the measures taken by countries. Indeed, an assessment of this efficiency by the way of monitoring is compulsory to determine the options with the most conclusive results according to each region.

However, the monitoring programme implemented, although being compulsory, should be spatially optimised, which means targeting for example litter accumulation areas that could summarize the global situation. It is obviously impossible to monitor all areas and coasts included in OSPAR.

The *Caretta caretta* turtle has been proposed as a macro-debris indicator in the Mediterranean Sea, it is listed as an endangered species by the IUCN (2012) and as a priority specie in the EU's Habitats Directive. *Caretta caretta* is among the several species suffering from entanglement in debris or accidental ingestion, which is the reason why the choice of this turtle is relevant to monitor the presence of plastic bags in the marine environment.

7.1 Presence of marine turtles in the OSPAR Region

The loggerhead sea turtle is a wide-ranging species, occurring throughout the temperate sub-tropical and tropical regions of the Atlantic (figure 4). In the northern Atlantic, the main egg-laying areas for the *Caretta* turtle are situated along the American coasts from South Virginia to Alabama and in the Cape Verdean archipelago²⁶. The egg-laying areas are located near the main oceanic currents in order to permit the newborn turtles to be transported in the oceanic and productive nutrition areas²⁷ in the North Atlantic gyre.

Turtles observed in the North sea, Celtic seas, Bay of Biscay, Iberian coasts and Atlantic open seas are mainly juvenile individuals in their oceanic development stage (shells with a length less than 63cm)²⁸. The majority of these juveniles can be found in the North east Atlantic (the Azores, Madeira, Canary Islands, Andalusia, Cape Verdean archipelago) and in the western Mediterranean Sea because of known feeding areas²⁹, some individuals may have deviated from their intended trajectory as a result of strong currents or storms and become scattered in the Northern Europe waters³⁰.

7.2 Litter ingestion risks

Cases of marine litter ingestion by sea turtles, mainly plastic debris, have been reported for the 7 existing species³¹ at all stages of life. Hydrodynamic mechanisms bring floating debris into convergence areas where pelagic turtles can be found³² while coastal debris mostly affect turtles with benthic behaviour. These plastic debris, including plastic bags can be ingested by protected sea turtles, causing lethal and sub-lethal effects³³.

Among the parameters explaining the ingestion of plastic debris by marine turtles, the main reasons are the omnipresence of floating plastic debris in the oceans, the attractive power of these debris on marine turtles, which can mistake them with prey items, such as jellyfish, or the presence of palatable marine organisms on these debris³⁴.

26 Conant *et al.*, 2009

27 Mansfield and Putman, 2013

28 Turtle Expert Working Group, 2009

29 Bellido *et al.*, 2008 ; Caminas and Valeiras, 2001; Ehrhart *et al.*, 2003

30 Monzon-Argüella *et al.*, 2012

31 Katsanevakis & Issaris, 2010; Secretariat of the Convention on Biological Diversity and the Scientific and Technical Advisory Panel, 2012

32 Witherington, 2012

33 Schuyler *et al.*, 2010

34 Casale *et al.*, 2008

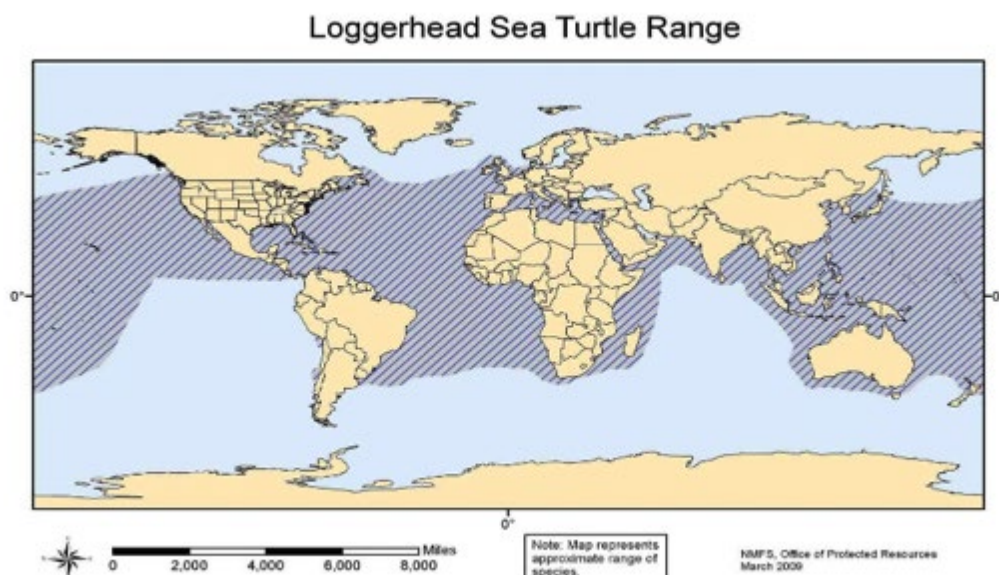


Figure 4: Loggerhead Sea Turtle Range. Source: NOAA Website

7.2.1 Diet, displacements, environment and marine litter patches

According to Dell'Amico & Gambaiani (2013), although sea turtles do not only use sight to differentiate between their prey and debris, they attempt to ingest all types of debris. When hungry, marine turtles, and particularly loggerhead (*Caretta caretta*) turtles, which present an opportunist feeding behaviour and do not differentiate debris according to their colour, ingest all items of appropriate size and consistence until satiety. The newborn loggerhead turtles can ingest any floating items small enough to be swallowed³⁵.

During development, the nutrition niche diversifies according to exploited environments and to the individual's capacity to eat tougher prey with a better nutritional quality. Considering the swimming speed of the loggerhead turtles, they are forced to feed on slow prey items³⁶. As mentioned above, it is possible for loggerhead turtles to mistake plastic bags for jellyfish, which they consume at all development stages³⁷. Debris can also be entangled or diluted in their bolus among prey gathered together in the convergence currents. Feeding in shallower waters or in superior columns, floating debris are the most dangerous for turtles as they are highly likely to ingest.

Loggerhead turtles are therefore likely to ingest plastic debris in different environments during their life. After hatching, the individuals' behaviour is quite unknown³⁸. They seem to be passive, dragged away by currents into ocean areas where predation risks are potentially less important. When growing, individuals progressively move closer to less deep environments when food diversity is more important. Turtles can then exploit both the seabed and water column³⁹.

According to Darmon *et al.* (2014), oceanic stage loggerhead turtles present a nomadic behaviour between different oceanic areas. Neritic stage individuals present a behavioural pliability, living or in exclusively neritic environments or in both neritic and oceanic environments. Loggerhead turtles are able to make long migrations for reproduction or according to sea temperatures and so to seasons. The probability of debris ingestion depends on the road followed by turtles during these migrations and so can vary annually or according to pollution levels in the occupied or crossed areas,

The figure 5 below, issued from transitional results of a study conducted by Darmon *et al.* (2016), highlights areas of marine litter high density and presence of turtles. These areas can be considered as "targeted areas" for a potential

35 Hughes, 1970 and 1974a
 36 Bjorndal, 1997 ; Tomas *et al.*, 2013
 37 Dell'Amico and Gambaiani, 2013
 38 Casale and Mariani, 2014
 39 Darmon *et al.*, 2014

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monitoring programme as the ingestion risks are high for the turtles in these areas. In the areas where the distribution of turtles and the distribution of marine debris intersect, the risk for sea turtles to meet debris in a 20km radius is 90,4%.

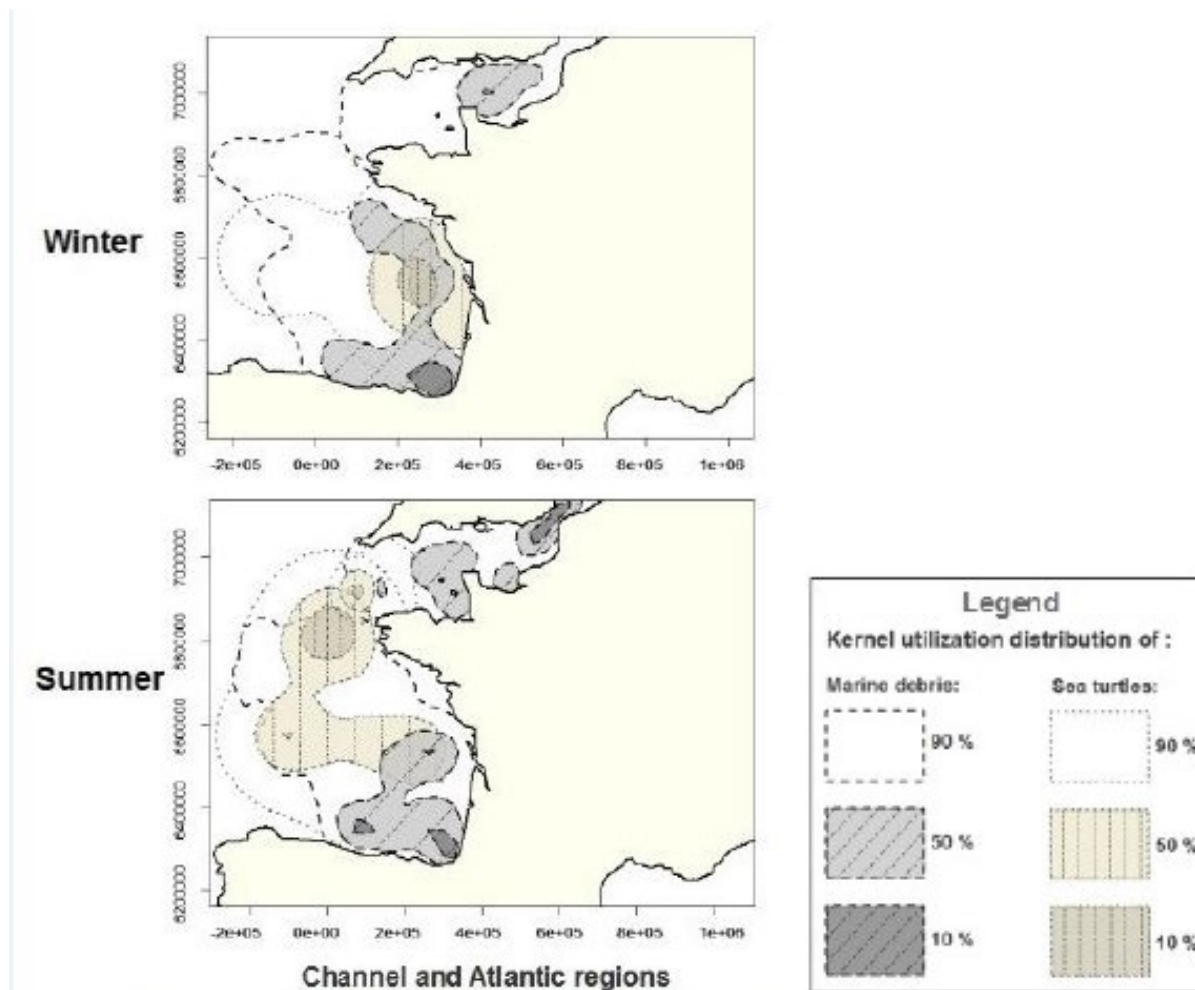


Figure 5: Distribution of marine debris and sea turtles in the Channel and Atlantic regions Source: Intermediary results by Darmon et al., 2016

7.2.2 Anatomy, physiology and state of health

The quantity of plastic debris ingested by loggerhead turtles increases with their size⁴⁰, probably caused by the higher energetic needs, the superior length of the digestive system and the ability to exploit a larger range of nutrition resources. However, the small size and the small thickness of the digestive system of the juveniles make them more vulnerable to litter ingestion and perforations it can cause⁴¹.

Most of the debris ingested by sea turtles simply pass through the digestive system and end up being defecated, the anatomy of the digestive system of sea turtles is favourable for obstruction because of the keratin thorns in the oesophagus and their cardiac sphincter that make regurgitation hard⁴². The several bumps of the intestinal wall are suitable for abrasion and accumulation of non-digested debris.

Plastic debris being non-biodegradable, can stay for a long time in the digestive system of sea turtles, which explains why most of the debris found in the digestive tract or in the faeces are plastic debris⁴³. According to several studies⁴⁴, plastic debris can stay in the sea turtles' digestive system from some days to 4 or 6 months, depending on the quantity ingested. Plastic debris piles up with time in the organism and the longer they remain inside the animal, the more they can be damaging they can be.

40 Tomas et al., 2002

41 Schuyler et al., 2012

42 Schulman and Lutz, 1995

43 Claro and Hubert, 2011

44 Lutz, 1990 ; Schulman & Lutz, 1995 ; Brand et al., 1999 ; Amorocho, 2008 ; Valente et al., 2008

Plastic debris were present in highest quantities in living turtles with a bad health than in beached turtles with a good nutritional state⁴⁵, which demonstrates that the ingestion of debris by sea turtles is linked with their state of health. Turtles, which consumed floating debris are unable to dive and feed normally, because of a digestive dysfunction⁴⁶.

7.2.3 Available data on litter ingestion by sea turtles in the world

According to Dell'Amico and Gambaiani (2013), no less than 3283 marine litter ingestion cases that were reported up to 2013. In the same study, the authors synthesised documents presenting litter ingestion cases for sea turtles. Their results for the region North East Atlantic are summarised in the figure 6. The ingestion rate for the world is presented in the appendices.

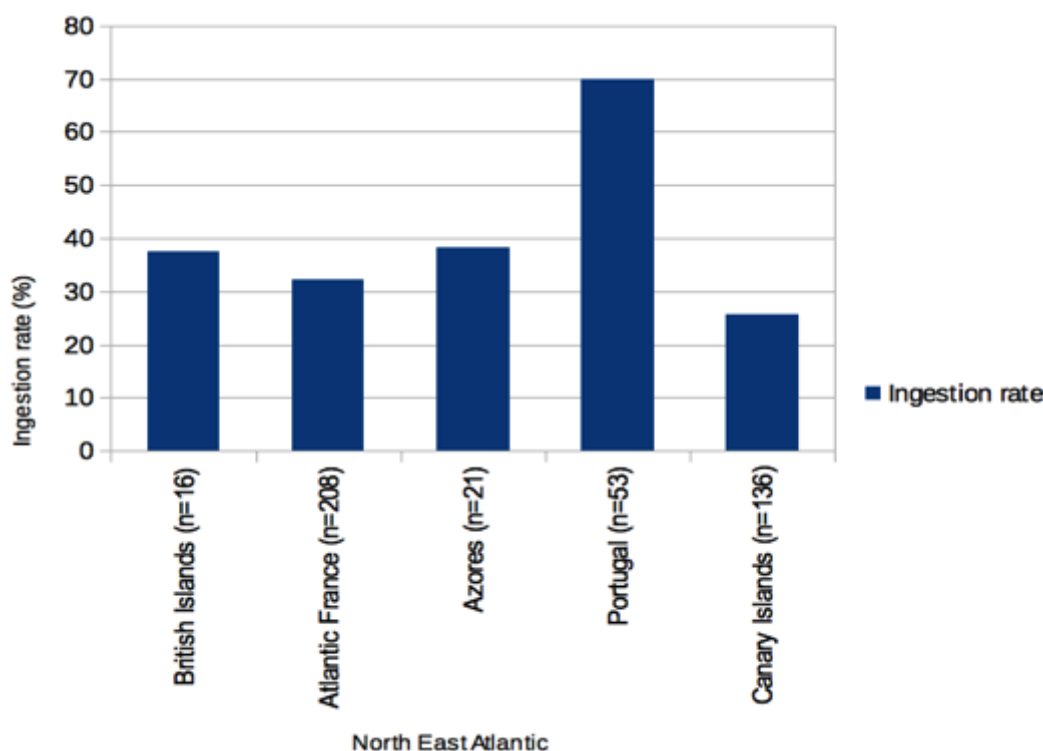


Figure 6: Marine litter ingestion rate for sea turtles in the Atlantic North East. Source : Dell'Amico and Gambaiani, 2013

Marine debris found in the digestive tract of sea turtles vary in terms of colour, shape and consistence⁴⁷. Plastic material (bags, sheets, fragments, films) seem, however, to be the most frequent debris found in the organisms or in the faeces of turtles of all species and in all the world's regions⁴⁸. Balazs's study in 1985 already presented plastic debris as the debris the most ingested by marine turtles.

7.2.4 Impacts of litter ingestion on sea turtles populations

The impact of plastic debris ingested by sea turtles on their organisms depends on the toxicity and the ability to remain stuck or cause lesion in the digestive system⁴⁹. According to Dell'Amico and Gambaiani study (2013), the main cause of death among sea turtles which ingested debris is the intestinal occlusion or the total obstruction of the digestive tract. The privation of food resulting from the digestive system occlusion is the main mortality cause among the sea turtles which ingested debris⁵⁰.

45 Travaglini *et al.*, 2013

46 Sarti and Barraghn, 1994

47 Van Nierop and Den Hartog, 1984 ; Witherington, 1994, Tomas *et al.*, 2002

48 Dell'Amico and Gambaiani, 2013

49 Bjorndal *et al.*, 1994

50 Laist, 1987

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Sharp and prominent debris are the most able to remain stuck and cause lesions in the digestive system⁵¹. Voluminous debris such as plastic bags can cause lethal intestinal occlusion⁵². In some cases, the plastic debris ingested by marine turtles pass through the digestive system and are simply expelled⁵³.

The partial obstruction of the digestive system or the ingestion of toxic elements can cause sub-lethal effects such as a dysfunction in the digestive process, a dilution of food, a weakening of the immune system, an accumulation of intestinal gases, buoyancy troubles, a malnutrition and lesions of the digestive tract. Otherwise, the stress caused by the partial obstruction following the ingestion of plastic debris can make individuals prone to sometimes lethal injuries⁵⁴.

Marine debris absorb toxic elements present in the oceans such as heavy metals or persistent organic pollutants. The ingestion of plastic debris can lead to a release of the toxic elements in the organism during the digestive process⁵⁵ and cause lethal and sub-lethal effects.

According to Dell'Amico and Gambaiani (2013), sub-lethal effects caused by the ingestion of plastic debris are more common and have much more impacts on sea turtles' populations than lethal effects. Although the ingestion does not systematically lead to death, it degrades the state of health of the animal and expose it to collision with boats risks, predation risks or capture by fishery equipment. In the long-term, sub-lethal effects such as obstruction of the digestive tract or reduction of the dietary stimuli are probably the most important threats. Indeed, by reducing the growth rate and delaying the sexual maturity, the reduction of the ingestion and absorption of food is particularly problematic for the juveniles and can have consequences on the demographical aspect of the sea turtles populations.

The capacity of the digestive system of a new born turtle does not permit them to offset the dilution phenomenon by increasing their food dose⁵⁶. The ingestion of marine debris by juveniles can:

- Reduce their capacity to reach appropriate currents in the open seas
- Reduce the growth and reproduction rates
- Extend their development periods during which the individuals' size makes them more vulnerable to predation and their energetic reserves are weak
- Reduce their lifespan

The impact of food dilution on sea turtles, possibly offset by an additional input of food is dependent on the size of the animal and their diet⁵⁷.

Other sub-lethal effects such as positive buoyancy troubles can severely disrupt the animals by reducing feeding periods, increasing the energy expenditure linked to diving, reducing escape capacity from predators, increasing collision risks and accidental capture by fishing gear.

Available data on debris ingestion make the assessment of the impacts of the debris on turtles population difficult. This impact is probably under-estimated⁵⁸. The impact of entanglements in marine debris is unknown and under-estimated because of the difficulties to collect data⁵⁹.

7.3 Implementation of the monitoring indicator on sea turtles

7.3.1 Sampling animals and ingested items

There are different possible methods to collect animals in order to determine their digestive content. The two main ways used in recent studies are the study of beached individuals or accidentally captured individuals⁶⁰. Turtles studied

51 Plotkin *et al.*, 1993 ; Duguy *et al.*, 1998 ; Tomas *et al.*, 2002, Katsanevakis, 2008

52 Plotkin *et al.*, 1993 ; Bjorndal *et al.*, 1994

53 Bjorndal *et al.*, 1994 ; Valente *et al.*, 2008

54 Balazs, 1985

55 Oehlman *et al.*, 2009 ; Teuten *et al.*, 2009

56 McCauley and Bjorndal, 1999

57 McCauley and Bjorndal, 1999 ; Tomas *et al.*, 2002

58 Galgani *et al.*, 2010

59 Laist, 1987

60 Dell'Amico and Gambaiani, 2014

can originate from other sources such as observations at sea, scientific campaigns or commercial activities. In the figure 7, the repartition between the three possible ways of sampling for different studies conducted until 2014 is shown.

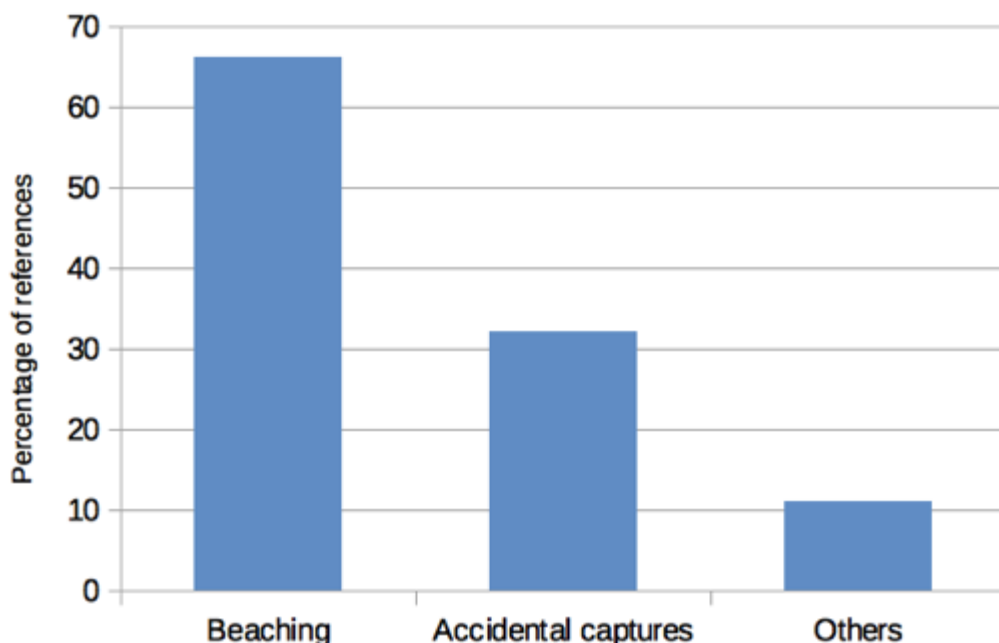


Figure 7: Origin of the individuals studied in the analysed references by Dell'Amico and Gambaiani (2014)

Depending on if the individual studied is alive or not, different techniques are available to collect debris in the digestive content of the turtles.

- Stomach cleaning or gastric lavage: allows to analyse only the first section of the digestive tract (oral cavity, oesophagus, stomach) which can under-estimate the debris ingestion⁶¹. This method appears to be the most efficient to analyse the diet of the turtles⁶² (non-invasive, economical, fast, efficient, can be repeated on a same individual).
- Analysis of faeces: allows to obtain information about the debris ingested several days to several weeks before the capture or beaching. Only a small part of the digestive system is considered with this method, which can under-estimate the debris ingestion⁵⁸. The collection of faeces on captive animals in care centres does not always reflect the diet of animals in their natural environment and with a good state of health⁵⁹. The collection and analysis of faeces in the natural environment is efficient but difficult. Some techniques are now available to develop this last point (use of dogs to localise faeces for example).
- Observation of ingested items: observation of sea turtles feeding at sea allows to obtain only qualitative information about their diet.
- External inspection: inspection of the oral cavity and cloaca can reveal the presence of lesions or foreign bodies.
- Recovery of debris in the oral cavity of animals at sea: these items recovered are generally the ones difficult to swallow or the ones remained blocked⁵⁹. This technique under-estimate the debris ingestion.
- X-ray or scan: can reveal the presence of intestinal gases⁶³, cases of occlusions of the digestivesystem by foreign bodies.
- Autopsy: allows to analyse the whole digestive tract. According to Forbes and Limpus (1991, 1999), the analysis of the digestive system content on beached animals does not reflect the diet of turtles in their natural environment and with a good state of health.

7.3.2 Analysis of the items collected

⁶¹ Wabnitz and Nichols, 2010 ; Schuyler *et al.*, 2013

⁶² Forbes and Limpus, 1991 ; Forbes, 1999

⁶³ Norton, 2005

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The bibliographic analysis of Dell'Amico and Gambaiani (2014) revealed that among the references analysed, plastics were the most found items in the digestive tract or faeces of sea turtles. The loggerhead and leatherback sea turtles ingest a majority of floating debris (such as plastic bags)⁶⁴.

Concerning plastic bags, the quantitative analysis of the presence of plastic bags or plastic bags fragments in the digestive tract or in the faeces can reflect the general situation in the oceans and the evolution of the presence of plastic bags in the marine environment. A long-term monitoring with systematic quantitative analysis can be a way to assess the efficiency of the measures implemented to fight the plastic bags pollution in the oceans.

7.4 Definition of an objective

An objective of reduction of the presence of plastics in marine turtles organisms is currently being defined by a French research group. This objective is defined for the Mediterranean region but can be applied to the whole OSPAR region. The definition of the objective presents limits for the quantity of marine turtles with plastic debris in their stomach among a defined number of observations. It can also present limits concerning the quantity of plastic found in the turtles.

7.5 Other potential indicators

The indicator on marine turtles presented only considers the ingested plastic debris. Plastic bags being relatively large floating items, an indicator on entanglement of marine turtles in plastic debris can be implemented. France responded to the DG ENV call of the European Commission with the previous indicator on ingested plastic debris by sea turtles but a sub-task is dedicated to the study of the possibility to implement an indicator based on the entanglement of marine turtles in marine debris.

To this day, no other study has demonstrated plastic bags ingestion or entanglement for other animals than sea turtles.

64 Plotkin *et al.*, 1993 ; Casale *et al.*, 2008 ; Mrosovsky *et al.*, 2009 ; Lazar and Gracan, 2011 ; Campani *et al.*, 2013

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APPENDICES

Appendix 1: Marine litter ingestion rates by sea turtles in the world (Source : Dell'Amico and Gambaiani, 2013*)

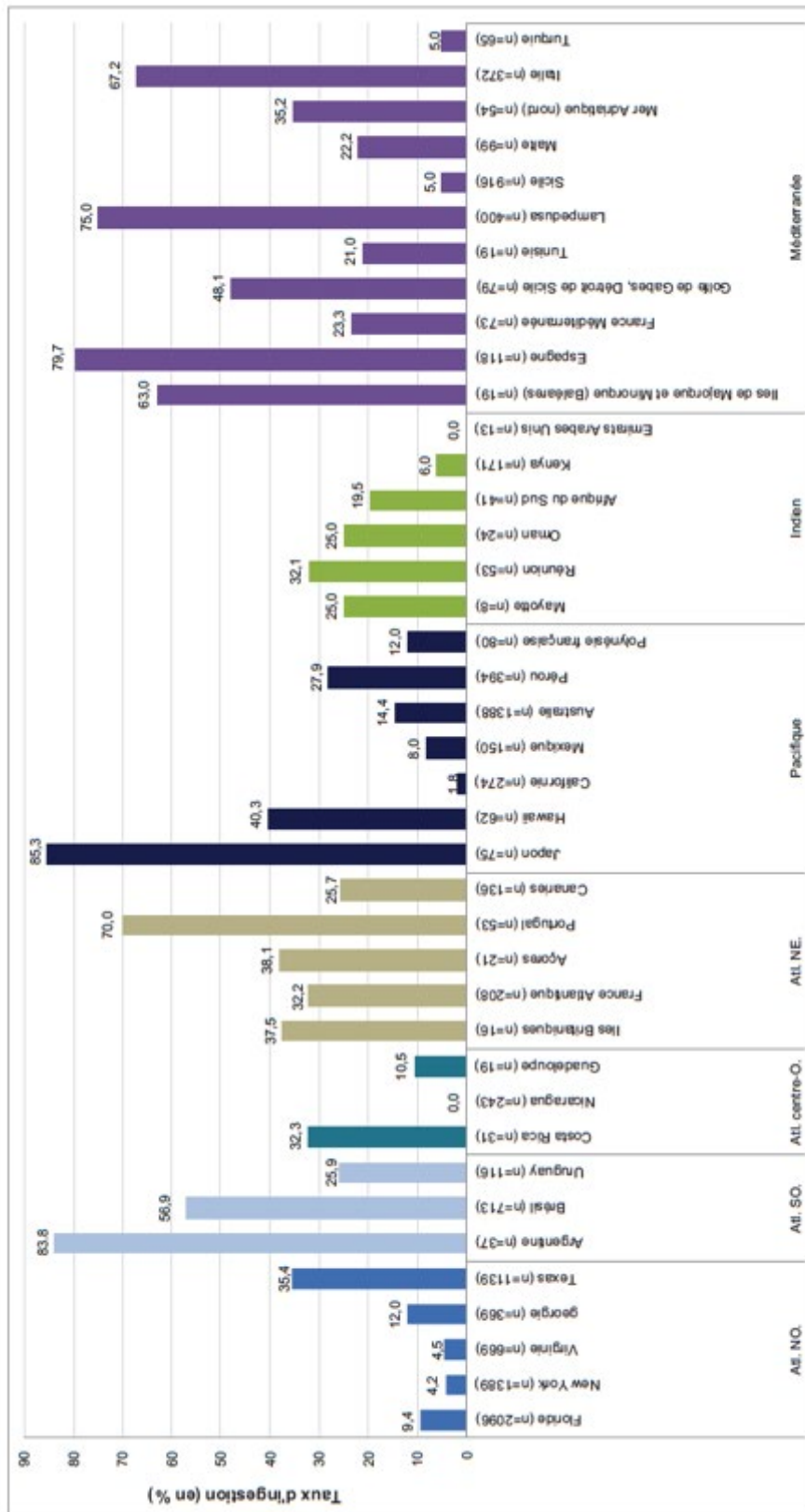
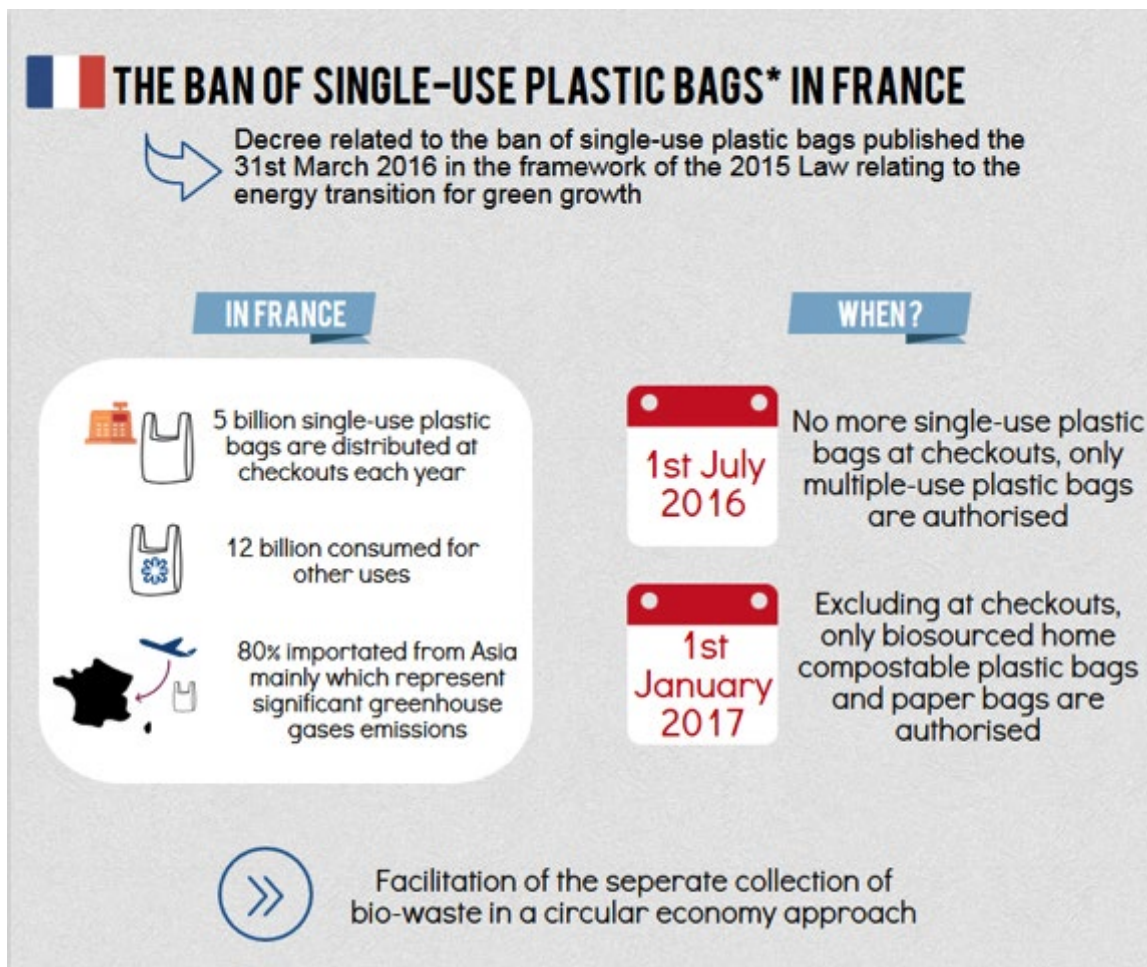


Figure 3. Taux d'ingestion de déchets par les tortues marines dans les différentes régions du monde.

Appendix 2: The plastic bags ban in France



* Single-use plastic bags are defined as bags with a thickness of less than 50 microns

Appendix 3: National measures and initiatives concerning plastic bags in OSPAR Contracting Parties

Member State (number of plastic bags used per citizen per year) ¹	Existing or planned legislation to avoid the use of plastic carrier bags	Voluntary initiatives	Achieved or planned outcomes
EU (average of 198 bags/person/year)	<p>2015: the EU Parliament has adopted a directive which modifies the packaging directive of 1994. Member States are free to choose by which measure they will reduce lightweight plastic carrier bags use (national reduction targets, economic instruments, proportionate and non-discriminatory marketing restrictions). The measures shall include::</p> <ul style="list-style-type: none"> - measures which ensure national consumption does not exceed 90 bags/person/year by end of 2019 and 40 bags/person/year by end of 2025 and/or - Instruments which ensure that no lightweight plastic carrier bags are provided freely from 31st December 2018. <p>2018: The European Commission presented a new directive proposal which concerns placing on the market of several single-use plastic products. It provides that Member States shall ensure that extended producer responsibility schemes are established for light plastic carrier bags. Therefore, producers of these products shall cover the costs of the collection of waste consisting of those single-use plastic products and its subsequent transport and treatment, including the costs to clean up litter and the costs of the awareness raising measures.</p>		Make the plastic bags consumption less than 90 bags/person/year by end of 2019 and 40 bags/person/year by end of 2025.
BELGIUM (100)	<p>2007: A federal environmental tax on single-use plastic carrier bags was introduced in May 2007 : a charge of 3€/kg of plastic bags applied for the distribution of plastic carrier bags for retailers</p> <p>The EU Directive regarding the reduction of the consumption of lightweight plastic carrier bags has been transposed on a national level in Belgium by the decision of the Interregional Packaging Commission according a modification of the</p>	<p>2003: The retailers' association Comeos produced a plan to reduce the use of plastic carrier bags in retail, which has been in place since 2003. Members committed to reducing "single-use" plastic bags by 20-25% by 2006 and by 60% by 2009.</p>	<p>In Flanders, the voluntary agreement led to an 80% reduction in disposable plastic carrier bags between 2003 and 2009.</p> <p>In Wallonia, the plan has led to a 60% reduction in disposable plastic bags for the period 2007-2010 compared to 2003.</p> <p>The 2010-2013 plan targeted a 90% reduction compared to 2003 in terms of tonnage/revenue. By 2011 an 86% reduction had been achieved.</p>

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	<p>accreditation of <u>FostPlus</u>, published in the Belgian Official Journal.</p> <p>This decision includes that Fost Plus is obliged to:</p> <ul style="list-style-type: none"> - declare the consumption of light plastic carrier bags on an annual basis (with the first declaration due on 09/15/2018) with a distinction being made between lightweight plastic carrier bags and very lightweight plastic carrier bags. For this Fost Plus applies the calculation method that is set by the European Commission. - AND to identify its members who, whether or not free of charge, provide lightweight plastic carrier bags to consumers. Without prejudice to the more stringent provisions that may be provided at federal or regional level, Fost Plus must develop an action plan, in collaboration with the members thus identified and their sectoral representatives to maximally reduce the consumption of lightweight and very lightweight plastic carrier bags. For lightweight plastic carrier bags the minimal objectives mentioned in the EU Directive apply. <p>The Walloon Region and Brussels-Capital Region decided to additionally imply more stringent provisions in their regional legislation by means of a prohibition on the use of single use plastic carrier bags (see below).</p> <p>2016: Since 1st December 2016, the use of single-use plastic check-out bags, regardless of their thickness, is forbidden in Wallonia.</p> <p>2017:</p> <ul style="list-style-type: none"> - In Wallonia, the use of single-use plastic bags, other than check-out bags, have been banned for non-food products since 1st March 2017, with an exception for the primary packaging of aquatic plants and aquatic animals. Special requirements apply to the packaging of food products: for vegetables and fruit sold in bulk, it is permitted to use single-use plastic bags until 1st March 2020. However, since 1st January 2018, these bags must have a minimum level of biobased content of 40% and must be suitable for home composting. This obligation of special composition also applies to single-use plastic bags 		
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	<p>intended to contain liquids or moist or liquid foods.</p> <p>- In Brussels, the use of single-use plastic check-out bags less than 50micron is forbidden since 1st September 2017.</p> <p>2018:</p> <p>- In September 2018 the use of single-use plastic bags less than 50micron, other than check-out bags, will be forbidden in Brussels. Similar exceptions are in place as in Wallonia. For the packaging of fruit and vegetables sold in bulk, the use of single-use plastic bags is allowed until 29th February 2020, provided they contain a minimum bio-sourced content of 40% and are home compostable from 1st January 2018 onwards. The same requirements apply to single-use plastic bags intended to contain liquids or moist or liquid foods and these are allowed until 31st December 2029. Also the use of single-use plastic bags for the primary packaging of aquatic plants and aquatic animals will be allowed until 31st December 2029.</p> <p>2019: Since 17 June 2019, it is prohibited for retailers in Flanders to distribute single-use lightweight plastic carrier bags for free. The price charged for the bags has to be made clearly visible to the customers. The measure will be evaluated after two years, as the aim is to increase the use of reusable bags, not a shift to single-use bags in other materials (e.g. paper bags).</p>		
DENMARK (80)	<p>1993: There has been a charge for plastic and paper carrier bags (with a volume of at least 5 liters) since 1993. The charge depends on the weight and material. On average it is 0.5 DKK per plastic bag (this charge is equal to 10 DKK/kg for paper bags and 22 DKK/kg (around €3) for plastic bags). It is up to individual businesses to decide whether or not they charge their customers for the bags (generally between 1.5 DKK and 4 DKK). As the cost can be absorbed in the cost of products, consumer behaviour change is not the direct target as in Ireland.</p> <p>2020: The tax on the carrier bags of plastic was tripled in 2020.</p>		<p>The environmental authorities do not have precise data on the number of carrier bags used. However, after the introduction of charges, the total use of plastic to make carrier bags fell from just under 18 750 tonnes in 1993 to around 7 750 tonnes in 1999. By 2009, use had crept back up to around 8 950 tonnes. In 2018 the figure is around 7.500 tonnes (all figures include plastic and paper carrier bags). According to environment authority data, carrier bags have become thinner since the introduction of charges Many municipalities, organisations and businesses encourage the use of</p>

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	2021: A mandatory minimum price for all carrier bags (regardless of size and material) of appr. 0.6 euro and a ban on thin plastic carrier bags (15<x<30 micrometer)		reusable bags.
FINLAND (80)	No legislation specifically targeting plastic carrier bags.	Almost all supermarkets sell durable bags, paper bags and plastic bags. Some public institutions and private companies provide free multiple-use cloth bags.	
FRANCE (90)	<p>2005 : France adopted a law banning the sale of non-biodegradable plastic bags by 2010 but the text was never applied since it was deemed to be in breach of certain provisions of the Packaging Directive. The 2010 budget (<i>Loi de finances rectificative pour 2010, article 47</i>) instead set up a tax on non-biodegradable “single-use” plastic carrier bags of €10/kg (around €0.06 per bag), which will be applied from 1 January 2014. This is set out in Article 266, as amended, of the general tax code book ‘<i>Code des Douanes</i>’. Biodegradable bags made from a minimum of 40% renewable resources would be exempt.</p> <p>2016/2017 :France is strongly involved in reducing significantly the use of disposable single-use and other items which impact the marine environment. The Law “Energy Transition for Green growth” published on 18 August 2015 provides for:</p> <ul style="list-style-type: none"> - the end of single-use plastic bags available at cash-desks (1 July 2016), - the end of other types of single-use plastic bags (for example those dedicated to fruits and vegetables) in shops, excepting biobased bags that are compostable in home composting (1 January 2017) - the end of single-use plastic cups, glasses and plates, excepting biobased ones that are compostable in home composting (1 January 2020). <p>Furthermore, France is in favour of a ban at EU level of oxo-degradable plastic packaging which is already banned in France since August 2015</p>	<p>1996: E.Leclerc (a supermarket chain) has progressively replaced free thin plastic bags with biodegradable, reusable and cotton carrier bags. The supermarket chain has reduced the number of plastic carrier bags distributed to consumers from 1bn in 1995 to 50m in 2005. By 2005, 94% of its costumers owned one or more reusable bags. Other chains have followed its example and some have voluntarily started charging for plastic bags.</p> <p>2003: The FCD (<i>Fédération des entreprises du Commerce et de la Distribution – Federation of business and retail firms</i>) retail federation made a commitment to reduce plastic carrier bag use in 2003 and aims to completely phase out thin plastic carrier bags by the end of 2011. Carrefour (supermarkets chain) aims to completely end free provision by 2012.</p> <p>2003: The island of Corsica banned plastic carrier bags in 2003. A</p>	<p>The tax is intended to reduce the use of free thin plastic carrier bags to as close to zero as possible. In past years, increased provision of reusable carrier bags has succeeded in considerably reducing the excessive provision of free thin plastic bags in France's supermarkets.</p> <p>The number of thin plastic carrier bags used in France decreased from 10.5bn to 1.5bn from 2002 to 2009.</p>

	<p>Plastic bags can be replaced by biosourced and home compostable bags (30 % biosourced in 2017 to 50 % in 2020). This bags must respect the Ok Home Compost label.</p> <p>Discussions engaged about controls and sanctions to be applied.</p>	<p>referendum was organised that proposed three options for the replacement of conventional plastic carrier bags: large reusable plastic bags costing €1, paper bags sold for €0.08, or bio-based bags sold between €0.05 and €0.14 depending on their size. Of the 30 448 persons who voted, the majority (61%) opted for the reusable plastic bag sold for €1.</p>	
GERMANY (24)	<p>In 2016 the German government signed an agreement with the retail industry to not distribute plastic bags any longer free of charge in order to reduce the annual consumption of plastic bags per German citizen from 71 to 40 by 2025 in accordance with EU law. Since 2016 the consumption of plastic bags has more than halved to 24 in 2018. In January 2022 an already adopted ban (under the packaging directive) of light-weight plastic bags with a thickness of 15-50 micrometer will come into force.</p>	<p>Supermarkets voluntarily charge for plastic bags. Most German supermarkets charge between €0.05 and €0.10 per "single-use" bag, depending on the type of bag.</p>	<p>The goal of an annual consumption per German citizen of 40 plastic bags per year is already far exceeded. Since 2016 the consumption of plastic bags has more than halved to 24 in 2018. In total 2 billion plastic bags have been consumed in 2018 compared to more than 7 billion in 2000.</p>
IRELAND (<40)	<p>2002 : A levy was introduced in March 2002 on the supply of plastic carrier bags in supermarkets, service stations and other sales outlets. It was set initially at a rate of €0.15 and the levy rate was increased to €0.22 on 1 July 2007 to address a rise in the usage of leviable bags</p> <p>The regulations do not distinguish between biodegradable plastic bags and other plastic bags but exemptions are made for plastic bags for use with, among other things, fresh fish, fresh meat poultry, fruit and nuts if not otherwise packaged and if the bag does not exceed 225 mm width, 345 mm depth, 450 mm length (including handle).</p> <p>The levy is paid into an environment fund, which is legislatively hypothecated for environmental activities including, but not limited to activities such as funding recycling centres and other waste initiatives, and funding environmental NGOs.</p>		<p>The effects of the tax on the use of plastic bags in retail outlets and in the landscape were dramatic. Within five months of introduction, a 90% reduction was achieved. At the same time, €3.5m was collected. At that time, it was estimated 328 bags per person per year were used. This number was reduced to 21. However there was subsequently a gradual increase in plastic bag usage, to 30 bags per person/year in 2006. In response, the plastic bag levy was increased. This resulted in a decrease to 26 bags per person in 2008 and reducing to an estimated 11,5 bags per person in 2015 based on levy receipts and census data. This has further reduced to below 8 leviable bags per person per year in 2019.</p>

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	<p>Annual revenues currently amount to c.€5.5m as of 2019 but were €26m in 2008. Levy revenues have declined considerably since 2008 as less and less leviable bags are purchased by consumers. Collection costs currently stand at c.7% of revenues but were below 3% of revenues when revenues were greater.</p> <p>2011 : a provision has been made in national legislation which sets a ceiling for the levy at €0.70 and enables the levy to be amended once in any financial year subject to specific criteria including the consumer price index.</p> <p>2020: The rate of the Plastic Bag Levy and exemptions for some bags costing more than 70c are currently being examined with a view to increasing the levy and further reducing demand for plastic bags. These proposals were recently the subject of a public consultation, the outcome of which is currently being considered.</p>		
ICELAND (?)	<p>2019: On September 1st 2019, a ban on handing out bags for free came into force through changes in legislation that were approved in May 2019. This ban does not only apply to plastic bags but all shopping bags regardless of material. The legislation also puts forward a ban on handing out plastic bags, whether a levy is added or not, that will come into force on the 1st of January 2021.</p>	<p>1996: A voluntary fund was established by supermarkets in 1996. Grocery stores take a charge for bags which the fund awards to social and environmental projects in Iceland. The levy on bags differs between stores, normal price is around € 0,1 – 0,6.</p> <p>Projects like Boomerang bags exist in Iceland where one can borrow a multi-use bag. Also stores now generally sell multi-use bags.</p>	<p>To achieve the goals of the EU concerning the reduction of plastic bag consumption (parallel to awareness campaigns, the authorities are working on improving data collection).</p> <p>2019 : The goal of the ban is that plastic bags will no longer be in use. Furthermore, a positive outcome would be more focus on less resource use in general.</p>
LUXEMBOURG (<40)	<p>2017: Luxembourg is strongly involved in reducing the use of single-use packaging or items. The Law on packaging and packaging waste published on 21 March 2017 provides for:</p> <ul style="list-style-type: none"> - the prevention of packaging waste as a priority, - the level of annual consumption shall not exceed 90 lightweight plastic bags 	<p>2004: A voluntary agreement is in place between the Environment Ministry and Valorlux (association of producers and importers of packaging material) regarding the sale of the multiple-use “Eco-sac” carrier bag. The voluntary agreement</p>	<p>The system is self-supporting, and in addition, each year two studies are undertaken, financed by the sale of multiple-use carrier bags</p> <p>In material terms, the quantity of single-use shopping bags was reduced from 578,2 tons (2004) to 51,1 tons (2016), which is a decrease of 91 % in waste material.</p> <p>In 2012, the European Commission designated the reusable shopping</p>

	<p>per person as of December 31, 2019 and 40 lightweight plastic bags per person on December 31, 2025.</p> <p>- As of December 31, 2018, no plastic bags are provided free of charge at the points of sale of goods or products.</p>	<p>has a target of a market share for multi-use carrier bags of at least 60% while taking the necessary steps to achieve a higher rate. This agreement was first made with food and DIY (Do It Yourself) shops. The first agreement was made in 2004, the second in 2006, and the third in 2008, and the fourth in 2012. It was renewed again in 2017 for a further period of five years. It is applicable throughout the country. An annual inspection is carried out by a commission made up of the CLC trade association, Valorlux and the Environment Ministry). Other sectors will be analyzed in order to extend the project. Participants were invited to withdraw their "own" multiple layer bags from the markets.</p> <p>2018: Luxembourg is actively seeking for solutions to replace the very lightweight bags in the fruit and vegetable department.</p> <p>Luxembourg has also introduced the "ECOBX", a return-and-refill system to take away food and leftovers. (www.ecobox.lu) The aim is to prevent takeaway packaging.</p> <p>The national resource and waste management plan renewed in 2018 also addresses specific objectives and measures in order to reduce single-use packaging, to fight against littering and to further promote reusable tableware and packaging.</p> <p>There are also several initiatives in order to promote reusable coffee-</p>	<p>bag project "Eco-Sac" as an example of good practice in the field of waste prevention</p> <p>Since 204, thanks to the "eco-sac" around 560 million single-use bags have been saved, saving 3738 tons of plastic and 8313680 liters of oil.</p>
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		to-go mugs and to use them at public events or popular marches. 2019: An evaluation guide for various alternative products to single-use plastic products has been drawn up in order to provide a decision support for citizens as well as for HORESCA companies.	
THE NETHERLANDS (80)	<p>2008: packaging importers, producers and purchasers pay a packaging tax, with different tariffs for each type of material. For plastic packaging such as plastic carrier bags, the tariff is currently €0.47/kg. To encourage the use of biodegradable carrier bags, these have a tariff of €0.08/kg</p> <p>2010: plastic waste has been collected separately in all around 430 Dutch municipalities and towns since 1 January 2010.</p> <p>2016: Dutch government banned the distribution of free plastic bags</p>	<p>1995: Voluntary agreements in retail so that supermarket customers don't receive most types of plastic carrier bag for free</p> <p>2016: today, customers pay around €0.20 per bag. In many shops there are "bag bins" where used bags can be deposited and used again by other customers. The retail sector recently announced that the smaller, translucent bags will not be offered free either.</p>	The Dutch Environment Ministry could not give details of the overall amount of plastic carrier bags placed on the market, or in relation to possible trends since the introduction of the legislation. They simply emphasise that currently 50-70% of plastic waste in Dutch households is recovered, and the measures put in place in the Netherlands in the last 20 years have led to a reduction in the use of plastic carrier bags approaching the situation of Ireland.
PORTUGAL (>500)	<p>Portuguese MPs have approved a legislative proposal to promote the following replacement measures:</p> <ul style="list-style-type: none"> ☐ Provision of biodegradable bags ☐ Provision of reusable bags at affordable price ☐ Environmental awareness of employees and consumers to promote the use of alternatives to plastic bags that are environmentally responsible; ☐ Promotion of environmental awareness campaigns among consumers, aimed at the separation of waste at source and the appropriate referral within the existing legal systems management; ☐ Adoption of one of the following economic mechanisms to encourage a reduction in the use of plastic bags: Levying a charge for the supply of plastic bags; Applying a discount on the price of goods sold to consumers desisting entirely from taking free plastic bags 		<p>The proposal sets a 90% reduction target for the supply and consumption of thinwalled plastic bags at wholesalers and supermarkets by 2017 against a 2007 baseline. There are intermediate targets of a 30% and 60% reduction by 2013 and 2015.</p> <p>Objectives of the 2016 new tax on plastic bags :</p> <p>Feb 2015 : 466 bags/hab/year</p> <p>Feb 2016 : below 50/hab/year</p>

	2016: 0,10€ charge for customers by most retailers		
NORWAY (?)	<p>2018: this is being discussed, but no decision is taken.</p> <p>2020: No legislation</p> <p>Norwegian retailers pay NOK 0,50 per plastic carrier bag to The Norwegian Retailers Environment Fund. The fee is in practice covered by consumers at the point of sale</p>	<p>2018: The Norwegian Retailers Environment Fund was established in 2018 as an initiative from the Norwegian business sector. From the 15th of August 2018, members of the Fund, mostly Norwegian retailers, will pay NOK 0,50 per plastic bag, which will be used in projects and initiatives related to the reduction of plastic pollution, increased plastic recycling and reduction of the consumption.</p> <p>2020: The Norwegian Retailers Environment Fund was established in 2018 as an initiative from the Norwegian business sector. From the 15th of August 2018, members of the Fund, mostly Norwegian retailers, pay NOK 0,50 per plastic bag, which are used in plastic littering projects and initiatives related to the reduction of plastic pollution and increased plastic recycling.</p>	
SPAIN (144)	<p>2011: In transposing the Waste Framework Directive in Law 22/2011, Spain envisaged the following reduction in plastic bag use compared to 2007:</p> <ul style="list-style-type: none"> - 60% fewer plastic carrier bags by 2013; - 70% by 2015; - 80% fewer plastic carrier bags by 2016. <p>Besides, the Law established an obligation in 2015 to print on all plastic bags with a message about the harmful environmental impacts of plastic carrier bags</p> <p>However, these measures were announced without notifying the EC, for which an EU pilot was launched. As a result, the reduction calendar, ban and printing was been suspended. A Royal Decree would be issued in the</p>	<p>There have also been voluntary agreements in Spain since at least 2008. The main retail associations signed up to voluntary agreements with the regional public authorities to promote the prevention and more sustainable use of carrier bags among consumers.</p> <p>Before July 1, 2018, some large supermarket chains already charged either for plastic carrier bags (e.g. Día) or paid a small amount back (around €0.10) if the customer did not take any plastic carrier bags (e.g. Eroski Group).</p>	<p>In Spain, as consequence of measures adopted to reduce the consumption of plastic carrier bags, the number of plastic bags per habitant was reduced from 317 in 2007 to 144 in 2014.</p> <p>Moreover, since the ban on free delivery of lightweight plastic carrier bags (July 1, 2018), a reduction in the consumption of these bags (with thickness between 15 and 50 microns) of 26% has been achieved in 2018 compared to previous year, which represent a decrease of 15,214 Tn.</p> <p>Furthermore, if we take into account the data for 2019, compared to 2018 a further reduction of 33.5% has been achieved of lightweight plastic carrier bags (decrease of 14,476 Tn). Another best practice example is <i>Pacto por la Bolsa</i> in Catalonia,</p>

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	<p>future with a revised timeline of single-use plastic bag reductions, prior notification to the EC.</p> <p>2009: The Spanish body for standardisation and certification (AENOR) made a standard on reusable PE carrier bags (UNE 53942 – 2009), guaranteeing their use at least 15 times.</p> <p>2010: The region of Andalucía agreed a charge for the use of plastic carrier bags in June 2010, which came into force on 1st May 2011. It provides for a charge of €0.05 per plastic carrier bag in 2011, which rose to €0.10 per plastic carrier bag in 2012.</p> <p>2018: a royal decree provides 3 measures:</p> <ul style="list-style-type: none"> - from 1st July 2018, no plastic bags (including plastic carrier bags with thickness upper 50 microns) are provided freely except very lightweight plastic carrier bags and plastic carrier bags with thickness upper 50 microns with 70% recycled plastic. -from 1st January of 2020, ban to provide oxo-degradable plastic carrier bag and compulsory 50 % of recycled plastic in plastic carrier bags with thickness upper 50 microns - from 1st January of 2021, complete ban to provide lightweight and very lightweight plastic carrier bags except compostable 		<p>signed in 2009. Its target was a reduction of consumption of “single-use” bags by 50% by 2012. By 2010, a reduction of 40% had been achieved.</p>
SWEDEN (100)	<p>Responsibility currently rests with producers, who are responsible for collection and disposal. The producer pays a disposal charge which is recovered through the price of the bag. Plastic bags could be collected at plastic packaging collection points.</p> <p>2016: new regulation states that anyone selling or disposing of plastic carrier bags should inform about how plastic bags affect the environment. It is also provided that if the Swedish EPA estimates that the consumption of plastic carriers does not decrease or that the consumption of thin plastic carriers will exceed the levels specified in the first paragraph, the Swedish EPA will propose appropriate measures to the government.</p> <p>Manufacturer and importers to Sweden should report to the Swedish</p>	<p>Supermarkets pass the cost of disposal and tax on to the consumer: a plastic bag costs €0.6-0.7.</p> <p>Different retailers in Sweden has taken measures to reduce the impact from plastic bags by introducing bags made of renewable materials (e.g. sugar cane) or recycled plastics.</p> <p>There are several initiatives concerning plastic carrier bags, for example, there is an initiative called “Panta påsen” (http://www.pantapasen)</p>	<p>Reporting shows that Sweden used 102 plastic carrier bags per person in 2018, a decrease of 12 bags per person per year compared to 2017.</p> <p>The annual consumption in Sweden for the type of plastic bags we carry home food in was 74 bags per person in 2019. There is a goal in the EU to reduce this type of plastic carrier bags to 90 pieces per person and in 2019 and to 40 pieces in 2025. The level for 2019 makes Sweden pass the first sub-target. (http://www.naturvardsverket.se/Nyheter-och-pressmeddelanden/Anvandning-av-plastbarkassar---Sverige-klarar-malet-for-2019-men-takten-behovet-oka/)</p>

	<p>EPA how many plastic bags they have put on the Swedish market. First reporting was in March 2018.</p> <p>2020: Sweden aims to reduce the number of plastic carrier bags per person without having a ban. Instead, Sweden has a requirement on information about environmental impact of plastic carrier bags and a tax on these bags as a complement to achieve the goals of the directive.</p>	<p>.se/) which is a deposit-refund system for plastic bags and another called “One Bag Habit” – for a more sustainable carrier bag consumption https://www.onebaghabit.se/</p>	
SWITZERLAND (?)	<p>2012: Aban voted by houses of the Swiss Parliament, but has not yet entered into force in 2016</p>		
UK (180)	<p>The Climate change act 2008, Section 77 and Schedule 6 (charges for single use carrier bags) extend to England and Wales and Northern Ireland only.</p> <p>England</p> <p>The Single Use Carrier Bags (SUCB's) Charges (England) Order 2015 requires large retailers (those with more than 250 employees) to charge a minimum of 5p for SUCBs and to report annually to Government on the proceeds from the charge. The legislation defines a SUCB as one that: is 70 microns thick or less; has handles and an opening and is not sealed; is new and has not already been used to take away or deliver sold goods. Further information for consumers and retailers is available at: www.gov.uk/government/collections/carrier-bags. This is not a tax but a levy.</p> <p>At the time the single-use carrier bags (England) order 2015 was introduced, micro, small and medium-sized enterprises (MSMEs) were excluded from the mandatory obligation to charge for these bags. However, an estimated 3.2 billion (over 80%) single-use carrier bags were circulated by MSMEs, airport retailers and civil and voluntary organisations in 2018 alone. The government believes that further measures are necessary to reduce consumption and encourage further reuse and decided to consult on proposals to achieve this.</p> <p>In December 2018, the government consulted on the proposal to extend the single-use carrier bag charge to all retailers and to increase the minimum</p>	<p>2006: A voluntary agreement between Defra and 21 large retailers had a target of a 25% reduction in the harmful environmental impact of carrier bags between May 2006 and December 2008. The amount of virgin polymer was used as an indicator and reusable bags were included.</p> <p>The agreement included support for reuse of carrier bags, increased recycling and a reduction in the weight of carrier bags. A second agreement followed with the target of a 50% reduction by May 2009 compared to 2006. Seven supermarket chains participated. The following agreement for 2010 (between the Scottish Government, Defra, the Welsh Assembly Government, and the Northern Ireland Department of the Environment with the British Retail Consortium (BRC) and its supermarket members) continued with the idea of further reductions, but did not set out concrete targets. The agreements were mainly aimed at simple plastic carrier</p>	<p>Defra statistics show that in May 2006, 870m thin bags were used in the participating supermarkets. In May 2009, this number was 452m and in May 2010 it was 475m. This is a reduction of around 45% compared to 2006, i.e. short of the target.</p> <p>Defra would like to achieve a 70% reduction in the long term. Further plans, such as the introduction of a charge for thin bags, are still an option according to Defra but are not currently being pursued. The devolved administrations in Scotland, Wales and Northern Ireland could however implement their own measures on this issue, such as those planned by Wales for October 2011.</p> <p>According to the WRAP, the following progress was made (figures include the overall number of carrier bags, not just thin bags):</p> <p>2008: -26%</p> <p>2009: -48%</p> <p>2010: decreasing trend stops; use of thin plastic bags increases 5% compared to May 2009.</p> <p>Scotland :</p> <p>2020: A report was commissioned to evaluate the impact of the charge one year after it was introduced. The report estimates that the charge has:</p> <ul style="list-style-type: none"> - Reduced single use carrier bag usage in the grocery sector by around 80 per cent since launch—equivalent to at least 650 million

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	<p>charge to at least 10p.</p> <p>The government response to this consultation has now been published and in August 2020 Defra announced that they will extend the single-use carrier bag charge to all businesses in England supplying goods and increase the minimum mandatory charge from 5p to 10p. The extension and increase of the charge will enter into force in April 2021</p> <p>Devolved Administrations have their own systems in place. Further information on their policies is available online.</p> <p><u>Scottish Government:</u></p> <p>The Single Use Carrier Bags (Scotland) Regulations 2014 require all retailers, regardless of size, to charge at least 5p for all single use carrier bags, regardless of material (so including paper). For plastic bags, this is defined as a bag (other than a small plastic bag) manufactured from material which is no more than 49 micrometres thick and is not intended for multiple reuse. Retailers with ten or more full time equivalent staff are required to keep records related to the charge but are not required to report or publish information.</p> <p>The Scottish Government does not make stipulations about how the money should be used (it is a requirement to charge, not a tax). Zero Waste Scotland maintains the Carrier Bag Commitment, which is an agreement with retailers for them to donate the money to good causes.</p> <p>2020: A report was commissioned to evaluate the impact of the charge one year after it was introduced.</p> <p>The Scottish Government is committed to increasing the charge to 10p to further reduce the sale of single use carrier bags and encourage the use of sustainable alternatives.</p> <p><u>Welsh Government:</u></p> <p>2009: Prior to 2009, a voluntary agreement between the Welsh Government, the Scottish Government, the Northern Ireland Department of the Environment and Defra with the British Retail Consortium (BRC) and its supermarket</p>	<p>bags that customers can get for free in supermarkets. There are no penalties involved.</p> <p>A variety of methods were used to cut use: some such as Marks and Spencer charge for bags, while others put signs in car parks reminding customers to reuse their bags. Others began giving out bags only when requested by customers.</p>	<p>fewer bags being handed out annually compared to 'business as usual'</p> <ul style="list-style-type: none"> - Raised approximately £6.7m for good causes - Achieved net savings of over 4,000 tonnes of material, taking account of factors such as increased use of bags for life, and increased small bin liner purchases - Saved over 2,500 tonnes of CO₂e annually.
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	<p>members was established. Working with WRAP UK, agreement was reached to reduce thin-gauge carrier bags by 50% by Spring 2009 against a 2006 baseline figure. This was narrowly missed, with a 48% reduction achieved across the UK.</p> <p>2010: The Welsh Government introduced regulations for all retailers to apply a 5p charge for each new single use carrier bag issued. This came into force on 1 October 2011.</p> <p>2014: Data provided by the Waste Resources and Action Programme (WRAP) for 2014 showed the supply of plastic SUCBs in seven major supermarkets in Wales had decreased by 78% since 2010.</p> <p>2016: The Welsh Government's SUCB Implementation Review 2016 estimates a 70% reduction in SUCB usage across the wider retail sector.</p> <p>2018: The Welsh Government commissioned a new study looking at attitudes and behaviors to carrier bags. This is intended to provide an up to date estimate of carrier bag usage in Wales. We will use this to help decide if further action in relation to carrier bags use is needed.</p> <p>Northern Ireland: DAERA – Department of Agriculture, Environment and Rural Affairs www.nidirect.gov.uk/ bag levy</p> <p>The Single Use Carrier Bags Charge Regulations (Northern Ireland) 2013 were made on 15 January 2013 and came into operation on 8 April 2013. From that date, all sellers of goods in Northern Ireland had to charge their customers at least 5 pence ("the levy") for each single use carrier bag supplied new. From 19 January 2015, the levy was extended to all carrier bags with a retail price of less than 20 pence, whether they are considered single use or reusable. The levy applies to carrier bags of all materials including plastic and paper.</p> <ul style="list-style-type: none"> - Bags at the lower rate are those costing the customer only the 5p levy. - Bags at the upper rate are those which have had a price added by the retailer in advance of the 5p levy being applied. 		
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	<p>Sellers are required to pay the net proceeds of the levy to DAERA and are required to declare the number of bags they have sold on a quarterly basis to the Department. A number of exemptions within the levy are applicable and there is no requirement within the legislation for sellers to report on exempt bags.</p> <p>Since the introduction of the carrier bag levy in 2013 (6 years in operation) there has been a reduction of over 1 billion bags in circulation in Northern Ireland.</p> <p>Officials within the Carrier Bag Levy Team are analysing whether any increase in the existing 5p Carrier Bag Levy is necessary and whether the existing 20p pricing threshold remains appropriate. Any changes to either the levy or the threshold would require changes to primary legislation.</p>		
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¹ According to the European Commission COMMISSION STAFF WORKING DOCUMENT - Impact Assessment for a Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive 94/62/EC on packaging and packaging waste to reduce the consumption of lightweight plastic carrier bags

Measures and initiatives in non-OSPAR countries

	Existing or planned legislation to avoid the use of plastic carrier bags	Voluntary initiatives	Achieved or planned outcomes
AUSTRIA	<p>A voluntary agreement 2016 – 2025 between the env ministry, trade companies (14 so far; 30% market share), and some NGOs envisaging reduction of the number of plastic carrier bags placed on the market by 50% in 2019 (reference year being 2014). From 1/6/2016, shops are no longer able to hand out free single-use plastic bags to customers.</p>	Some Austrian supermarkets have stopped offering single-use plastic bags.	
CYPRUS	<p>2008: A proposal to require charging for plastic bags failed in 2008.</p> <p>2016: the government wants to introduce a surcharge on shopping bags by the end of 2018 in a bid to follow EU regulations</p>	2016: a petition for a ban of plastic bags was launched	
CZECH REPUBLIC	Supermarkets that do not charge their customers for plastic bags must pay the		

	<p>government some 230 euros (\$320) per ton for their disposal.</p> <p>2016: Directive 2015/720 was transposed on 1/1/2018. It provides for a tax on plastic bags between 15 to 50 microns.</p>		
ESTONIA	<p>Directive 2015/720 was transposed by a Packaging Act on 17 April 2017. It introduced an obligation to charge the sale of plastic carrier bags, a obligation to report on the supply and sale of plastic carrier bags and an obligation on packaging undertakings (any person who packages, imports or sells packaged goods) to offer other possibilities for packaging goods.</p> <p>Bag manufacturers are responsible for arranging the recovery or recycling of their product. If recycling or material recovery targets are missed, producers must pay a tax based on the shortfall amount.</p>	Retailers charge about 10 euro cents (14¢) per bag.	
FINLAND	<p>Directive 2015/720 was transposed via a voluntary agreement of 30/10/2016. It provides for voluntary measures of the retail sector to ensure that the minimum objectives concerning the consumption of lightweight plastic carrier bags are reached in Finland.</p>	Most supermarkets charge for all types of grocery bags.	
HUNGARY	<p>A tax (environmental product charge) on plastic bags was put in place in 2012. There were discussion since 2017 about drastically increasing the environmental tax on lightweight plastic bags in supermarkets but no change in the law has been made yet.</p> <p>Directive 2015/720 was transposed in February 2017.</p>	Some supermarkets choose to charge for plastic bags.	
ITALY	<p>1988: Italy passed a law taxing importers and producers of non-biodegradable bags 100 lira (7¢) per bag, but it did not last or appear effective.</p> <p>2007: A national pilot program aiming to gradually reduce consumption of non-biodegradable shopping bags began</p> <p>2011: Italy banned single-use plastic bags. The ban has not been fully implemented because of legal disputes over EU internal market rules. It nevertheless led to a reduction of plastic bags consumption of more than 50% since 2011.</p> <p>2013: The Italian government has passed a law banning the sale of non-biodegradable plastic bags, despite a legal challenge by the United Kingdom government</p> <p>Directive 2015/720 was transposed by a Decree-Law no. 91 on 20 June 2017 (Art. 9-bis). Both economic instruments (prohibition of distribution free of charge)</p>		

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	and marketing restrictions (bans) for certain types of plastic bags are provided for. It is envisaged to progressively decrease the placing on the market of very lightweight plastic bags. The decree-law distinguishes biodegradable and compostable plastic carrier bags from others.		
LATVIA	Packaging legislation that entered into force in January 2018 phases out plastic bags free of charge as of 2019. Retailers are taxed to pay for the disposal of plastic bags.		
MACEDONIA	2009: stores were barred from giving out free plastic bags. Customers reportedly pay 1 denar (2¢) for a bag		
MALTA	There is an eco-tax in place since 2009, but seems to be ineffective. Directive 2015/720 was transposed in September 2017 almost literally without concretization of measures.		
POLAND	The Directive 2015/720 was transposed in October 2017 (delay of 23 months). As of 2018, lightweight plastic bags are sold at 0,20 PLN (0,05 EUR).		
ROMANIA	2009: Romania introduced a 20 bani (6¢) per bag eco-tax on plastic bag producers and importers		
SLOVAKIA	Waste act no. 79/2015 as amended in 2017 transposed directive 2015/720. SK decided to use economic instruments to fight the consumption of plastic bags: a fee on lightweight plastic bags ranging from 0,03 to 0,09 per bag since March 2017 and retailers are obliged to keep a record.	Billa, Hypernova, and Kaufland are among the food stores that charge for plastic bags.	
SLOVENIA	The legislation transposing the directive was adopted in July 2017. It will be prohibited to give lightweight plastic bags for free from 1/1/2019 and provides that the annual consumption level of light plastic carrier bags may be up to 40 light plastic carrying bags per person. There is an obligation on distributors to keep records on the sale of such bags. Many supermarkets have already taken the initiative to not hand out free plastic bags anymore before the entry into force of these obligations.		
ISRAEL	2017: a law came into force to forbid plastic bags with a thickness of 20 microns or less, while customers must pay for bags between 20 and 50 microns. But bags intended to be in contact with food and without handles continue to be provided for free		80 per cent of reduction in plastic bags consumption in less than a year and bag waste found in the sea has halved.
RWANDA	2004: prohibition of production, importation and commercialisation of plastic carrier bags. At the airport, any person can enter in the country with plastic bags. Any kind of		

	smuggling is liable to prison sentences.		
MADAGASCAR	<p>2014: decree which prohibit production, importation and commercialisation of plastic carrier bags of 50 microns or less. Nevertheless, this decree has never been applied.</p> <p>2017: a new decree has been written to prohibit the same type of plastic carrier bags than in 2014, however it has difficulty to be applied.</p>		
KENYA	2017: prohibition of production, importation and commercialisation of plastic carrier bags. At the airport, nobody cannot enter in the country with any plastic bags.		

Appendix 4 : Map of the repartition of plastic debris on the seabed

Source : Galgani et al., 2000

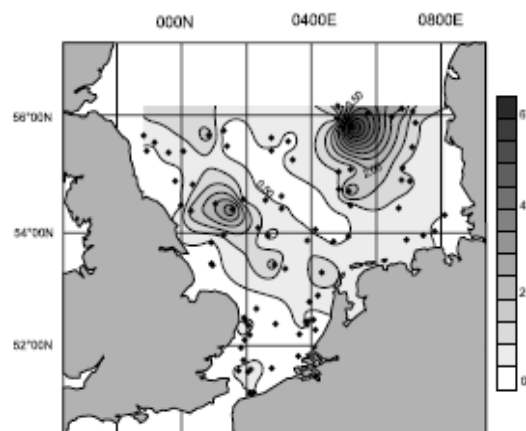


Fig. 2 Isoconcentration curves for total debris in the North Sea. Results were obtained after kriging data from the cruise IBTS98 (see Materials and Methods) and are expressed in items per hectare. (•): Sampling sites.

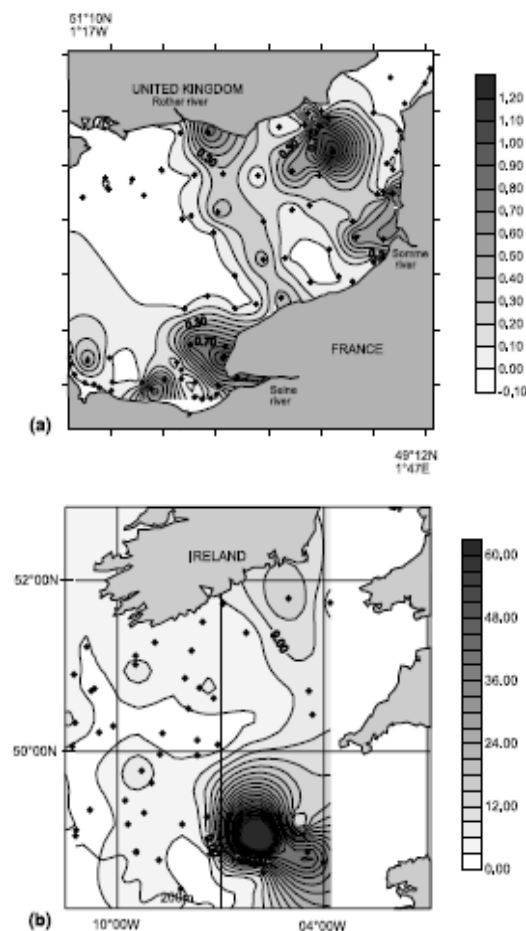


Fig. 3 Isoconcentration curves for total debris in the eastern part of the channel (a) and the continental shelf of the Celtic Sea (b). Results were obtained after kriging data from the cruise CGFS98 (a) and EVH0E98 (b) (see Materials and Methods) and are expressed in items per hectare. (•): Sampling sites.

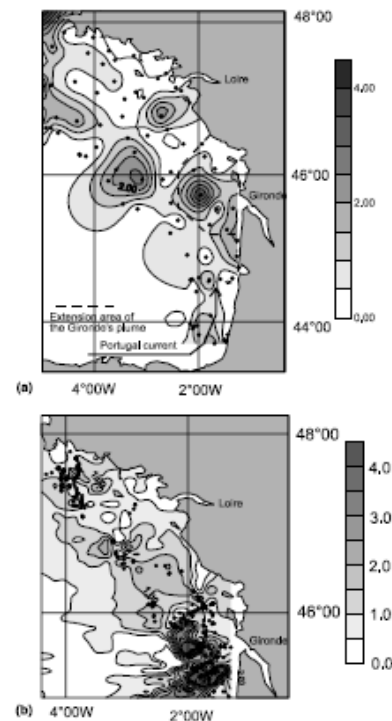


Fig. 4 Isoconcentration curves for total debris in Bay of Biscay. Results (items per hectare) were obtained after kriging data from the cruises EVH0E94 (74 sites sampled in September). (•): Sampling sites.



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Our vision is a clean, healthy and biologically diverse North-East Atlantic Ocean, which is productive, used sustainably and resilient to climate change and ocean acidification.

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