Annexes

Annex I. UNEA Resolution 1/6 Marine plastic debris and microplastics

The United Nations Environment Assembly,
Recalling the concern reflected in the outcome document of the United Nations Conference on Sustainable Development, entitled: "The Future We Want",that the health of oceans and marine biodiversity are negatively affected by marine pollution, including marine debris, especially plastic, persistent organic pollutants, heavy metals and nitrogen-based compounds, from numerous marine and land-based sources, and the commitment to take action to significantly reduce the incidence and impacts of such pollution on marine ecosystems,

Noting the international action being taken to promote the sound management of chemicals throughout their life cycle and waste in ways that lead to the prevention and minimization of significant adverse effects on human health and the environment,

Recalling the Manila Declaration on Furthering the Implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities adopted by the Third Intergovernmental Review Meeting on the Implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, which highlighted the relevance of the Honolulu Strategy and the Honolulu Commitment and recommended the establishment of a global partnership on marine litter,

Taking note of the decisions adopted by the eleventh Conference of the Parties to the Convention on Biological Diversity on addressing the impacts of marine debris on marine and coastal biodiversity,

Recalling that the General Assembly declared 2014 the International Year of Small Island Developing States and that such States have identified waste management among their priorities for action,

Noting with concern the serious impact which marine litter, including plastics stemming from land and sea-based sources, can have on the marine environment, marine ecosystem services, marine natural resources, fisheries, tourism and the economy, as well as the potential risks to human health;

1. Stresses the importance of the precautionary approach, according to which lack of full scientific certainty should not be used for postponing cost-effective measures to prevent environmental degradation, where there are threats of serious or irreversible damage;

2. Recognizes the significant risks arising from the inadequate management and disposal of plastic and the need to take action;

3. Encourages governments, intergovernmental organizations, non-governmental organizations, industry and other relevant actors to cooperate with the Global Partnership on Marine Litter in its implementation of the Honolulu Strategy and to facilitate information exchange through the online marine litter network;

4. Recognizes that plastics, including microplastics, in the marine environment are a rapidly increasing problem due to their large and still increasing use combined with the inadequate management and disposal of plastic waste, and because plastic debris in the marine environment is steadily fragmenting into secondary microplastics;

5. Also recognizes the need for more knowledge and research on the source and fate of microplastics and their impact on biodiversity, marine ecosystems and human health, noting recent knowledge that such particles can be ingested by biota and could be transferred to higher levels in the marine food chain, causing adverse effects;

6. Notes that microplastics may also contribute to the transfer in the marine ecosystems of persistent organic pollutants, other persistent, bioaccumulative and toxic substances and other contaminants which are in or adhere to the particles;

7. Recognizes that microplastics in the marine environment originate from a wide range of sources, including the breakdown of plastic debris in the oceans, industrial emissions and sewage and run-off from the use of products

containing microplastics;

8. Emphasizes that further urgent action is needed to address the challenges posed by marine plastic debris and microplastics, by addressing such materials at source, by reducing pollution through improved waste management practices and by cleaning up existing debris and litter;

9. Welcomes the establishment of the Global Partnership on Marine Litter launched in Rio de Janeiro, Brazil, in June 2012 and the convening of the first Partnership Forum in 2013;

10. Also welcomes the adoption by the contracting parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) at its eighteenth ordinary meeting, held in Istanbul, Turkey, from 3 to 6 December 2013, of the Regional Action Plan on Marine Litter Management, the world's first such action plan, and welcomes the draft Action Plan on Marine Litter for the North-East Atlantic region awaiting adoption by the Commission of the Convention for the Protection of the Marine Environment of the North-East Atlantic at its meeting in Cascais, Portugal, and encourages governments to collaborate through relevant regional seas conventions and river commissions with a view to adopting such action plans in their regions;

11. Requests the Executive Director to support countries, upon their request, in the development and implementation of national or regional action plans to reduce marine litter;

12. Welcomes the initiative by the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection to produce an assessment report on microplastics, which is scheduled to be launched in November 2014;

13. Also welcomes the work undertaken by the International Whaling Commission on assessing the impacts of marine debris on cetaceans and the endorsement by the Conference of the Parties to the Convention on the Conservation of Migratory Species of Wild Animals at its tenth meeting of resolution 10.4, addressing the impacts of marine debris on migratory species;

14. Requests the Executive Director, in consultation with other relevant institutions and stakeholders, to undertake a study on marine plastic debris and marine microplastics, building on existing work and taking into account the most up-to-date studies and data, focusing on:
(a) Identification of the key sources of marine plastic debris and microplastics;
(b) Identification of possible measures and best available techniques and environmental;
practices to prevent the accumulation and minimize the level of microplastics in the marine environment;
(c) Recommendations for the most urgent actions;
(d) Specification of areas especially in need of more research, including key impacts on the environment and on human health;
(e) Any other relevant priority areas identified in the assessment of the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection;

15. Invites the secretariats of the Stockholm Convention on Persistent Organic Pollutants, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and relevant organizations involved in pollution control and chemicals and waste management and the secretariats of the Convention on Biological Diversity, the Convention on Migratory Species and the regional seas conventions and action plans to contribute to the study described in paragraph 14 of the present resolution;

16. Encourages governments and the private sector to promote the more resource-efficient use and sound management of plastics and microplastics;

17. Also encourages governments to take comprehensive action to address the marine plastic debris and microplastic issue through, where appropriate, legislation, enforcement of international agreements, provision of adequate reception facilities for ship-generated wastes, improvement of waste management practices and support for beach clean-up activities, as well as information, education and public awareness programmes;

18. Invites governments, intergovernmental organizations, the scientific community, non-governmental organizations, the private sector and other stakeholders to share relevant information with the Executive Director pertinent to the study described in paragraph 14;

19. Invites those in a position to do so to provide financial and other support to conduct the study identified in paragraph 14;

20. Requests the Executive Director to present the study on microplastics for the consideration of the United Nations Environment Assembly at its second session.

Annex II. a) Common chemical additives in plastics; b) Common organic contaminants absorbed by plastics

a) Common chemical additives in plastics

Short form	Full name	Examples of function
BPA	Bisphenyl A	A monomer used in the manufacture of polycarbonates and epoxy resins
DBP	Dibutyl Phthalate	Anti-cracking agents in nail varnish
DEP	Diethyl Phthalate	Skin softeners, colour and fragrance fixers
DEHP	Di-(2-ethylhexyl)phthalate	Plasticizer in PVC
HBCD	Hexabromocyclododecane	Flame retardant
PBDEs	Polybrominated Diphenyl Ethers (penta, octa & deca forms)	Flame retardants
	Nonylphenol	Stabilizer in PP, PS
phthalates	Phthalate esters	Improve flexibility and durability

b) Common organic contaminants absorbed by plastics

Short form	Full name	Origin
DDT	Dichlorodiphenyltrichloroethane	Insecticide
PAHs	Polycyclic Aromatic Hydrocarbons	Combustion products
PCBs	Polychlorinated Biphenyls	Cooling and insulating fluids, e.g. in transformers

Annex III. Examples of concentrations of plastics in rivers flowing to the ocean

Table III.1. Examples of concentrations of plastics in rivers flowing to the ocean (adapted from GESAMP 2016)

Location	Compartment	Sampling	Abundance (densities)	References
Europe				
Danube river, Austria, Europe	Surface water	Sizes classes: <2mm, 2-20mm Sampling mesh: 500mm	Max: 141 647.7 items /1000m^{-3} Mean: 316.8 (±4664.6) items/ 1000 m^{3} 73.9% represent spherules (~3mm)	Lechner 2014
Elbe, Mosel, Neckar and Rhine rivers, Germany, Europe	Sediment	Size classes: <5mm	Max: 64 items kg^{-1} dry weight, Mean: not indicated	Wagner 2014
Po river/Adriatic Sea	Surface water	Neuston net (330µm), Monthly,	1 (Spring) to 12.2 items m^{-3} (winter)	Vianello 2013
Seine river/ English Channel	Surface water	A plankton net (80mm mesh), and (ii) a manta trawl (330mm mesh)	(i) Plankton net: 3-108 particles/m3. (ii) Manta trawl: 0.28–0.47particles m^{-3}	Dris 2015
Rhine, Main Rivers, Germany	Sediment	63−5000µm Three size clases: 630−5000, 200−630, and 63−200µm	Range: 228−3763 particles kg^{-1}	Klein 2015
Solent: Hamble, Itchen and Test as tributaries to Southampton Water in Hampshire, UK	Surface water	1235 (total of 4 samples) sampled in each estuary. 0.3mm mesh	Itchen 1.55mp m^{-2} Test 5.86m^{-2} Hamble 0.4mp m^{-2} Total all estuaries: 3.72m^{-2} (Southampton water 1.29m^{-2})	Gallagher 2015
Tamar estuary, UK, Europe	Surface water	Size classes: <1mm, 1e3mm, 3e5mm, >5mm Sampling mesh: 300mm	Max: 204 pieces of suspected plastic Mean: 0.028 items m^{-3} Abundances include all plastic particles, of which 82% represents size <5mm	Sadri 2014
North America				
North Shore Channel (Chicago, USA)	Surface water	Two neuston nets (0.92 × 0.42m and 0.36 × 0.41m) of 333-µm mesh	Upstream waters : 1.94 (0.81) particles m^{-3} Downstream waters : 17.93 (11.05) particles m^{-3}	McCormick 2014
St. Lawrence River, Canada/USA,	Sediment	Size classes: not indicated. Items size range: 0.4-2.16mm	Mean: 13 759 (±13 685) items m^{-2} max at 136 926 (±83947) items m^{-2}	Castañeda 2014
Los Angeles River, San Gabriel River, Coyote Creek, USA, North America	Surface, mid and near-bottom water	Size classes: >1.0 and <4.75mm, >4.75mm Sampling mesh: 333, 500, and 800µm	Max: 12 932 items m^{-3} Mean 24-h particle counts on date of greatest abundance: Coyote creek: 5000 items m^{-3} San Gabriel river: 51 603 items m^{-3} Los Angeles River: 1 146 418 items m^{-3} Item size class: 1.0-4.75mm	Moore 2011
South America				
Elqui, Maipo, Maule and BioBio rivers, northern-central (29° S) to southern central Chile (37° S)	Surface water	Neuston net with a mesh size of 1mm and an opening area of 27 * 10.5cm^{2}. 6 2 counts by scientists + 2-6 counts by students	Elqui Mouth : 0.12875m^{-3} Maipo: 0.647m^{-3} Maule: 0.74m^{-3} BioBio: 0.05m^{-3}	Rech 2015
Asia				
Nakdong River (187.1 m3/s)/ Jinhae Bay, southern Korea.	Surface water	Trapping of surface water, 2mm mesh screen, 100 times, 3.14m^{2} /2.2-2.8l. samples/station	120 particles l^{-1} (10% paints) , 187±207 particles l^{-1} after heavy rain	Song 2015
Yangtze Estuary, China	Surface	Pumping/filtration (32-µm steel sieve)	4137 ± 2462m^{-3}	Zhao 2014

Annex IV. Abundance of microplastics in subtidal sediments worldwide

Table IV.1 Abundance of microplastics in subtidal sediments worldwide. Location and location specification (Modified from Van Cauwenberghe et al. 2015).

Continent	Location	Location Specification	Depth	Particle Size	Measured Abundance	Reference
Americas	US	Maine Subtidal		0.250mm-4mm	105 items/L	Graham & Thompson 2009
	US	Florida Subtidal		0.250mm-4mm	116-215 items/L	Graham & Thompson 2009
	Brazil	Tidal Plain		1mm-10cm	6.36-15.89 items/m^2	Costa et al. 2011
Asia	India	Shipbreaking Yard		1.6mm-5mm	81.4mg/kg	Reddy et al. 2006
	Singapore	Mangrove		1.6mm-5mm	36.8 items/kg dry	Nor & Obbard 2014
Europe	UK	Estuary			2.4-5,6 fibres/50ml	Thompson et al. 2004
	Sweden	Subtidal		2mm-5mm	2-332 items/100ml	Noren 2007
	Belgium	Harbour		0.38mm-1mm	166.7 items/kg dry	Claessens et al. 2011
		Continental Shelf	0-200m		97.2 items/kg dry	
	Italy	Subtidal		0.7mm-1mm	672-2175 items/kg dry	Vianello et al. 2013
	Slovenia	Shelf	Infralittoral (<50m)		30-800items/kg dry	Bajt *et al.* 2015
Oceanic Sediments	Polar Ocean, Mediterranean, North Atlantic, Gulf of Guinea	Deep Sea	1176-4848	5 mm-1mm	0.5 items/cm^2	Van Cauwenberghe et al. 2013
	NW Pacific	Deep Sea Trench	4869- 5766	0.300mm-5 mm	60-2020 items/m^2	Fisher et al. 2015
	Subpolar/North Atlantic	Deep Sea Mount Slope	1000-2000	0.032-5mm	10-15 pieces per 50ml	Woodall et al. 2015
	North East Atlantic	Canyons/Slope	1400-2200	0.032-5mm	6-40 pieces per 50ml	Woodall et al. 2015
	Mediterranean	Canyons/Slope/Basin	300-3500	0.032-5mm	10-35 pieces per 50ml	Woodall et al. 2015
	SW Indian	Seamount	500-1000	0.032-5mm	Up to 4 pieces per 50ml	Woodall et al. 2015

Annex V Entanglement of Cetaceans and Pinnipeds

Table V.1: Overview of literature containing data on entanglement of cetaceans (from Butterworth et al. 2012)

Species / Subspecies	Region (FAO statistical areas [FAO 2012])	Entanglement rate (% entangled each year)	Entanglement rate (by animal or by % of population with scars)	Fishing pot gear debris (%)	Net (derelict) debris (%)	Mortality estimate (%)*	Source
Humpback whale	Western Central Atlantic			41	50	10	Johnson et al. 2005
Humpback whale	North West Atlantic	2.4	17 whales become entangled each year			26	Cole et al. 2006
Humpback whale	North West Atlantic	8-10.4	48-57				Robbins & Mattila 2004
Humpback whale	North East Pacific	8	52-78				Neilson et al. 2007
Western grey whale	North West Pacific		18.7				Bradford et al. 2009
Minke whale	North East Atlantic		5-22				Northridge et al. 2010
Minke whale	North West Pacific			31	69	0.9	Song et al. 2010
Minke whale	North West Atlantic	2.6	7 whales per year			37	Cole et al. 2006
North Atlantic right whale	North West Atlantic		57	25	67	12	Kraus 1990
North Atlantic right whale	North & Central West Atlantic	1.6	6 whales per year			27	Cole et al. 2006
North Atlantic right whale	North & Central West Atlantic	1.15		71	14	29	Johnson et al. 2005
Fin whale	North East Atlantic		5				Sadove & Morreale 1990
Fin whale	North West Atlantic	0.8	2 whales per year			44	Cole et al. 2006
Blue whale	North West Atlantic		<1 whale per year				Cole et al. 2006
Bryde's whale	North West Atlantic	0.2	<1 whale per year				Cole et al. 2006

Table V.2: Overview of literature containing data on the entanglement of pinnipeds (from Butterworth et al. 2012).

Species / Subspecies	Region (FAO statistical areas [FAO 2012])	Entanglement rate (% incidence in population)	Plastic debris (%)	Net debris (%)	Fishing Line debris (%)	Mortality estimate (%)*	Source
Kalikoura fur seal	South West Pacific	0.6-2.8	31	42			Boren et al. 2006
Australian fur seal	Eastern Indian Ocean	1.9	30	40		73	Pemberton et al. 1992
New Zealand fur seal	Eastern Indian Ocean	0.9	30	29	3	57	Page et al. 2004
Australian sea lion	Eastern Indian Ocean	1.3	11	66	6	44	Page et al. 2004
Antarctic & Sub – Antarctic fur seal	Western Indian Ocean	0.24	41	17	c. 10		Hofmeyr et al. 2002
Antarctic fur seal	South East Atlantic	0.024-0.059	18	48		50	Hofmeyr et al. 2006
Antarctic fur seal	South West Atlantic	0.4	46-52			80	Arnould and Croxhall 1995
Cape fur seal	South East Atlantic	0.1-0.6	50				Shaughnessy 1980
Californian sea lion	Eastern Central Pacific	3.9-7.9		50	33		Harcourt et al. 1994
Hawaiian monk seal	Eastern Central Pacific	0.7	8	32	28	16	Henderson 2001
Stellar sea lion	North East Pacific	0.26	54	7	2		Raum-Sayuran et al. 2009
Californian sea lion	Eastern Central Pacific	0.08-0.22	25	19	14		Stewart & Yochem 1987
Northern elephant seal	Eastern Central Pacific	0.15	36	19	33		Stewart & Yochem 1987
Harbour seal	Eastern Central Pacific	0.09	33				Stewart & Yochem 1987
Northern fur seal	North East Pacific	0.24		50			Stewart & Yochem 1987

Annex VI Ingestion of microplastics by marine oraganisms

Table VI.1. Laboratory studies exposing organisms to microplastics. Organisms which have a commercial interest have a * after the species name. Table includes all published studies until 11th November 2015. (Rochman et al highlighted as it is a freshwater study)

Species	Common Name	Size of Ingested Material	Polymer	Exposure Concentration	Length of exposure	Particle endpoint	Effect	Source
Phylum Dinoflagellata								
Oxyrrhis Marina		7.3µm	PS	3000 per ml	1 hr	Digestive tract	Ingestion	Cole et al. 2013
Phylum Chlorophyta								
Tetraselmis Chuii		1 – 5µm	PE	0.000046 - 0.0015 per ml	96 hrs	Cellular	No significant effect on growth, did not interact with toxicity of copper	Davarpanah & Guilhermino 2015
Scenedesmus Spp.		20nm	PS	1.6-40mg per ml	2 hrs	Cellular	Absorption, ROS increased, photosynthesis affected	Bhattacharya et al. 2010
Phylum Haptophyta								
Isochrysis Galbana		2µm	PS	9 x 10^4 per ml	6 hrs	External	Microspheres attached to algae, no negative effect observed	Long et al. 2014
Phylum Dinophyta								
Heterocapsa Triquetra		2µm	PS	9 x 10^4 per ml	6 hrs	External	Microspheres attached to algae, no negative effect observed	Long et al. 2014
Phylum Cryptophyta								
Rhodomonas Salina		2µm	PS	9 x 10^4 per ml	6 hrs	External	Microspheres attached to algae, no negative effect observed	Long et al. 2014
Phylum Ochrophyta								
Chaetoceros Neogracilis		2µm	PS	9 x 10^4 per ml	6 hrs	External	Microspheres attached to algae, no negative effect observed	Long et al. 2014
Phylum Ciliophora								
Strombidium Sulcatum		0.41 -10µm	-	5-10% ambient bacteria concentration	1 hr	Digestive tract	Ingestion	Christaki et al. 1998
Tintinnopsis Lobiancoi		10µm	PS	1000, 2000, 10000 per ml	3 hrs	Digestive tract	Ingestion	Setälä et al. 2014
Phylum Cnideria								
Obelia Sp.		20.6	PS	2240 per ml	1 hr	Digestive tract	Partial ingestion	Cole et al. 2013

Dipsastrea Pallida	Coral	10µm-2mm	PP	0.395mg per ml	48 hrs	Mouth and mesenteries of polyps	Ingestion	Hall et al. 2015
Phylum Rotifera								
Synchaeta Spp.		10µm	PS	2000 per ml	3 hrs	Digestive tract	Ingestion	Setälä et al. 2014
Phylum Annelida								
Arenicola Marina	Lugworm	20-2000µm	-	1.5mg per ml	Several days	Digestive tract	Ingestion	Thompson et al. 2004
Arenicola Marina	Lugworm	130µm	U-PVC	0-5% by weight	48 hour, 4 weeks	Digestive tract	Ingestion, reduced feeding, increased phagocytic activity, reduced available energy reserves, lower lipid reserves	Wright et al. 2013
Arenicola Marina	Lugworm	230µm	PVC	1500g of sediment	10 days	Digestive tract	Ingestion, oxidative stress	Browne et al. 2013
Arenicola Marina	Lugworm	< 5mm	HDPE, PVA, PA	0.02, 0.2 2% of sediment	31 days	Digestive tract	Concentration in sediment had significant effects on the metabolic rate of lugworms (increase mp = increase metabolic rate)	Green et al. 2015
Arenicola Marina	Lugworm	400-1300µm	PS	0, 1, 10, 100 mg per ml	28 days	Faeces	Ingestion, reduced feeding, weight loss	Besseling et al. 2013
Galeolaria Caespitosa	Fan worm	3 – 10µm	-	5000 per ml	20 mins	Digestive tract	Ingestion	Bolton & Havenhand 1998
Marenzelleria Spp.		10µm	PS	2000 per ml	3 hrs	Digestive tract	Ingestion	Setälä et al. 2014
Phylum Mollusca								
Bivalvia (larvae)		7.3µm	PS	3000 per ml	24 hrs	Digestive tract	Ingestion	Cole et al. 2013
*Mytilus Edulis**	Blue mussel	30nm	PS	0, 0.1, 0.2, 0.3 mg per ml	8 hrs	Digestive tract	Ingestion, pseudofaeces, reduced filtering	Wegner et al. 2012.
*Mytilus Edulis**	Blue mussel	0 – 80µm	HDPE	2.5mg per ml	< 96 hrs	Digestive tract, Lymph system	Ingestion, retention in digestive tract, transfer to lymph system, immune response	Von Moos et al. 2012 & Köhler 2010
*Mytilus Edulis**	Blue mussel	0.5µm	PS	50µL per 400 ml seawater	1 hr	Digestive tract	Ingestion, trophic transfer to *Carcinus maenas*	Farrell & Nelson 2013
*Mytilus Edulis**	Blue mussel	3, 9.6µm	PS	0.51mg per ml	12 hrs	Digestive tract, Lymph system	Ingestion, retention in digestive tract, transferred to lymph system	Browne et al. 2008
*Mytilus Edulis**	Blue mussel	10µm	PS	2×10^{4} per ml	45 mins	Faeces	Ingestion, egestion	Ward & Tagart 1989

*Mytilus Edulis**	Blue mussel	10µm	PS	1000 per ml	45 mins	Faeces	Ingestion, egestion	Ward & Kach 2009
*Mytilus Galloprovincialis**	Mediterranean mussel	< 100µm	PS, PE	1.5mg per ml	7 days	Gills, digestive tract and lymph system	presence in haemolymph, gills and digestive gland	Avio et al. 2015
*Mytilus Galloprovincialis**	Mediterranean mussel	50nm	PS	1, 5, 50 µg per ml	-	Haemocytes	Only the haemocytes were exposed, signs of cytotoxicity	Canesi et al. 2015
*Mytilus Trossulus**	Bay mussel	10µm	PS	/	0.5 - 1.5 hr	Digestive tract	Ingestion	Ward et al. 2003
*Placopecten Magellanicus**	Atlantic Sea scallop	15, 10, 16, 18, 20µm	PS	1.05 per ml	1 hr	Faeces	Ingestion, retention, egestion	Brilliant & MacDonald 2000
*Placopecten Magellanicus**	Atlantic Sea scallop	15, 10, 16, 18, 20µm	PS	1.05 per ml	1 hr	Faeces	Ingestion, retention, egestion	Brilliant & MacDonald 2002
*Crassostrea Virginica**	Eastern oyster	10µm	PS	1000 per ml	45 mins	Faeces	Ingestion, egestion	Ward & Kach 2009
*Crassostrea Gigas**	Pacific oyster	2, 6µm	PS	1800 per ml for the 2µm size; 200 per ml for the 6µm size	2 months	Digestive tract	Increased filtration and assimilation, reduced gamete quality, slower larval rearing for larvae from MP exposed parents	Sussarellu et al. 2014
Phylum Echinodermata								
Apostichopus Californicus	Giant Californian sea cucumber	10, 20µm	PS	2.4 per µL	-	Digestive tract	Ingestion, retention	Hart 1991
Thyonella Gemmate	Striped sea cucumber	0.25-15mm	PVC, PA	11g PVC shavings, 60g resin pellets, 2g nylon line, to 600ml of silica sand	20-25 hrs	Digestive tract	Selective ingestion	Graham & Thompson 2009
Holothuria (Halodeima) Grisea	Grey sea cucumber	0.25-15mm	PVC, PA	As above	20-25 hrs	Digestive tract	Selective ingestion	Graham & Thompson 2009
Holothuria Foridana	Florida sea cucumber	0.25-15mm	PVC, PA	As above	20-25 hrs	Digestive tract	Selective ingestion	Graham & Thompson 2009
*Cucumaria Frondosa **	Orange footed sea cucumber	0.25-15mm	PVC, PA	As above	20-25 hrs	Digestive tract	Selective ingestion	Graham & Thompson 2009
*Paracentrotus Lividus**	Sea urchin	40nm	PS	<25µg per ml	48 hr	Digestive tract	Accumulation and embryo toxicity	Della Torre et al. 2014
Lytechinus Variegatus	Green sea urchin	3-5mm	PE	2ml per 8ml	24 hr	External	Toxic effects, inc. anomalous embryonic development	Nombre et al. 2015
*Tripneustes Gratilla**	Collector urchin	32-35µm	PE	1, 10, 100, 300 per ml	1-6hrs, 9 days	Faeces	Ingestion, egestion	Kaposi et al. 2014
Dendraster Excentricus	Eccentric sand dollar	10, 20 µm	PS	2.4 per µL	-	Digestive tract	Ingestion, retention	Hart 1991

*Strongylocentrotus Sp**	Sea urchin	10, 20 µm	PS	2.4 per µL	-	Digestive tract	Ingestion, retention	Hart 1991
Ophiopholis Aculeate	Crevice brittle star	10, 20 µm	PS	2.4 per µL	-	Digestive tract	Ingestion, retention	Hart 1991
Dermasterias Imbricate	Leather star	10, 20 µm	PS	2.4 per µL	-	Digestive tract	Ingestion, retention	Hart 1991
Phylum Arthropoda								
Semibalanus Balanoides	Barnacle	20-2000 µm	-	1mg per ml	Several days	Digestive tract	Ingestion	Thompson et al. 2004
Tigriopus Japonicas	Copepod	0.05µm	PS	9.1×10^{11} per ml	24 hrs	Faeces	Ingestion, egestion, mortality, decreased fecundity	Lee et al. 2013
Tigriopus Japonicas	Copepod	0.5µm	PS	9.1×10^{8} per ml	24 hrs	Faeces	Ingestion, egestion, mortality, decreased fecundity	Lee et al. 2013
Tigriopus Japonicas	Copepod	6µm	PS	5.25×10^{5} per ml	24 hrs	Faeces	Ingestion, egestion, mortality, decreased fecundity	Lee et al. 2013
Acartia (Acanthacartia) Tonsa	Copepod	7-70 µm	-	3000-4000 beads per ml	15 mins	Digestive tract	Ingestion, size selection	Wilson 1973
Acartia Spp.	Copepod	10µm	PS	2000 per ml	3 hrs	Faeces	Ingestion	Setälä et al. 2014
Acartia Clausi	Copepod	7.3, 20.6, 30.6 µm	PS	635, 2240, 3000 beads per ml	24 hrs	Digestive tract	Size based selection: Ingestion at 7.3 µm , no ingestion at 20.6 µm, partial ingestion at 30.6 µm	Cole et al. 2013
Eurytemora Affinis	Copepod	10µm	PS	1000, 2000, 10,000 per ml	3 hrs	Faeces	Ingestion, egestion	Setälä et al. 2014
Limnocalanus Macrurus	Copepod	10µm	PS	1000, 2000, 10, 000 per ml	3 hrs	Digestive tract	Ingestion	Setälä et al. 2014
Temora Longicornis	Copepod	1.7, 3.8, 7.3, 20.6, 30.6 µm	PS	635, 2240, 3000 beads per ml	24 hrs	Digestive tract	Ingestion	Cole et al. 2013
Temora Longicornis	Copepod	20µm	PS	100 per ml	overnight	Digestive tract	Ingestion 10.7 ± 2.5 beads per individual	Cole et al. 2014
Calanus Helgolandicus	Copepod	20µm	PS	75 per ml	23 hrs	Faeces	Egestion, ingestion	Cole et al. 2015
Calanus Helgolandicus	Copepod	7.3, 20.6, 30.6 µm	PS	635, 2240, 3000 beads per ml	24 hrs	Digestive tract	Ingestion	Cole et al. 2013
Centropages Typicus	Copepod	7.3, 20.6, 30.6 µm	PS	635, 2240, 3000 beads per ml	24 hrs	Digestive tract	Ingestion	Cole et al. 2013
Idotea Emarginata	Isopod	10µm	PS	0.3-120 mg/g	3 days	Faeces	Ingestion, presence in stomach, faeces, no evidence of assimilation, no absorbance, no adverse effect on life history	Hamer et al. 2014
Orchestia Gammarellus	Amphipod	20 – 2000µm	-	1g per individual (n = 150)	several days	Digestive tract	Ingestion	Thompson et al. 2004

Talitrus Saltator	Amphipod	10 – 45µm	PE	10% weight (0.06-0.09 p/g dry food	24 hrs	Faeces	Ingestion, egestion after 2 hours	Ugolini et al. 2013
Allorchestes Compressa	Amphipod	11 - 700µm	PE	0.1 per g	72 hrs	Faeces	Ingestion, egestion within 36 hours	Chua et al. 2014
Neomysis Integer	Shrimp	10µm	PS	2000 spheres per ml	3 hrs	Digestive tract	Ingestion	Setälä et al. 2014
Mysis Relicta		10µm	PS	2000 spheres per ml	3 hrs	Faeces	Ingestion, egestion	Setälä et al. 2014
*Carcinus Maenas**	Shore crab	8 - 10µm	PS	4.0 x 10^4 per l ventilation 1.0 x 106 per g	16 hrs, 24 hrs, 21 days	Faeces	Ingestion through gills and gut, retention and excretion, no biological effects measured	Watts et al. 2014
*Carcinus Maenas**	Shore crab	250-500µm	-	180mg per 9 cubes of feed	3 weeks	Digestive tract	Ingestion, MP presence did not affect PAH uptake	Msc thesis: Zoeter Vanpoucke Mechtild
Uca Repax	Fiddler crab	180-250µm	PS	108-1000mg/kg	2 months	Gills, Digestive tract, Lymph system	2 month exposure, 100% with MP found in gills, stomach, hepatopancreus. More MP exposure, more MP in crab. Not sure of effect	Brennecke et al. 2015
*Nephrops Norvegicus**	Norway lobster	5mm	PP	10 fibres per cm^3 fish	24 hrs	Digestive tract	Ingestion	Murray and Cowie 2011
Porcellanidae (zoea)	Decopoda	30.6µm	PS	635 beads p/ml	24 hrs	Digestive tract	Partial Ingestion	Cole et al. 2013
Paguridae (zoea)	Decopoda	20.6µm	PS	2240 beads p/ml	24 hrs	Digestive tract	Partial Ingestion	Cole et al. 2013
Caridea (larvae)	Decopoda	20.6µm	PS	2240 beads p/ml	24 hrs	Digestive tract	Ingestion	Cole et al. 2013
Barchyura (megalopa)	Decopoda	20.6µm	PS	2240 beads p/ml	24 hrs	Digestive tract	Ingestion	Cole et al. 2013
Artemia Franciscana	Brine shrimp	40 & 50 nm	PS	5-100 µg p/ml	48 hrs	Digestive tract	Ingestion, no mortality, possible effect on motility, some excretion	Bergami et al. 2015
*Nephrops Norvegicus**	Norway lobster	500 - 600 µm loaded with 10 µg of PCBs	PE	150mg microplastics in gelatine food	3 weeks	Faeces	Ingestion, 100% egestion. Increase of PCB level in the tissues. Same increase for positive control. No direct effect of microplastics.	Devriese et al. in prep
Phylum Chordata								

Doliolidae	Tunicata	7.3µm	PS	3000 beads ml	1 hr	Digestive tract	Ingestion	Cole et al. 2013
Pomatoschistus Microps	Common goby	1 - 5 µm	PE	18.4 & 184 µg p/l	96 hrs	External	Abnormal swimming behaviour and lethargy, ACHe activity affected	Oliveria et al. 2013
Pomatoschistus Microps	Common goby	420 - 500 µm	PE	< 30 per fish	3 mins	Digestive tracts	Ingestion, significant decrease in predatory performance	De Sa et al. 2015
Pomatoschistus Microps	Common goby	1 - 5 µm	PE	0.216 mg p/l	/	Digestive tracts	The toxicological interaction between MP and Cr(VI) at conc >3.9 mg/l decreased predatory performance (67%) and caused significant inhibition of ACHe activity (<31%)	Luis et al. 2015
*Gadus Morhua**	Atlantic cod	2, 5 mm	PE	/	/	Faeces	Ingestion, egestion, 5mm held for prolonged periods, emptying of plastics improved by food consumption additional meals.	Dos Santos & Jobling 1991
*Oryzias Latipes**	Japanese medaka	<0.5mm	LDPE	Ground up as 10% of diet	1-2 months	Digestive tracts	Liver toxicity, pathology, hepatic stress	Rochman et al. 2013
*Oryzias Latipes**	Japanese medaka	<0.5mm	LDPE	Ground up as 10% of diet	1-2 months	Digestive tracts	Altered gene expression, decreased choriogenin regulation in males and decreased vitellogenin and choriogenin in females	Rochman et al. 2014
*Dicentrarchus Labrax**	Seabass (larvea)	10 - 45 µm	PE	0-105 per g incorporated with food	8dph - 26dph	Digestive tract	Ingestion, no significant increase in growth, effect on survival of larvae. Possible gastric obstruction.	Mazurais et al. 2014
Halichoerus Grypus	Grey seal	3mm	PE	2818 beads (99% recovery)	96 hours	Faeces	Used as a tracer for diet study	Grellier and Hammond 2006
Calonectris leucomelas	Streaked shearwater	3-5 mm	PE	1g of beads exposed to PCBs ~ 97ng per g	1st day exposed, studied for 42 days	Chemicals in preen oil	Ingestion, chemical transfer	Teuten et al. 2009

Table VI.2 Evidence of microplastic ingestion by field studies organisms. If mean not available, range is reported. Standard deviation is reported where possible.* represents percentage ingestion by total number of individuals, not separated by species. * species which are commercially important

Scientific name	Common name	Number of individuals	% with microplastic	Mean particles per individual (SD)	Range	Polymer	Type of microplastic	Size ingested (mm)	Study location	Source
Phylum Mollusca										
Dosidicus gigas	Humboldt squid	30	26.7	/	0-11	/	Nurdles	3-5mm	British Columbia, Canada	Braid et al. 2012
*Mytilus galloprovincialis**	Mediterranean mussel	17	/	Total: 0.08 (0.09)-0.34 (0.22sd) p/g	/	/	Fibres, particles	<5mm	Tagus Estuary, Portugal	Vandermeersch et al. 2015
*Mytilus galloprovincialis**	Mediterranean mussel	17	/	Mean: 0.11 (0.12)-0.15 (sd0.33) p/g	/	/	Fibres, particles	<5mm	Ebro Delta Coastal Embayment, Spain	Vandermeersch et al. 2015
*Mytilus galloprovincialis**	Mediterranean mussel	5	/	Mean: 0.25 (0.26sd) p/g	/	/	Fibres, particles	<5mm	Goro, Italy	Vandermeersch et al. 2015
*Mytilus galloprovincialis**	Mediterranean mussel	5	/	Mean: 0.04 (0.09sd) p/g	/	/	Fibres, particles	<5mm	Amposta, Ebro Delta, Spain	Vandermeersch et al. 2015
*Mytilus galloprovincialis**	Mediterranean mussel	18	100	4.33 (2.62)	/	PET, PA, PE	Fibres, fragments, pellets	<5mm	Fish market, china	Li et al. 2015
*Mytilus galloprovincialis**	Mediterranean mussel	17	/	Mean 0.05 (0.11)-0.16 (0.11 sd) p/g	/	/	Fibres, particles	<5mm	Po estuary, Italy	Vandermeersch et al. 2015
*Mytilus edulis**	Blue mussel	5	/	Mean 0.06 (±0.13) particles p/g	/	/	Fibres	<5mm	Baie de Saint Brieux, France	Vandermeersch et al. 2015
*Mytilus edulis**	Blue mussel	5	/	Mean 0.32 (±0.22) p/g	/	/	Fibres, particles	<5mm	Inschot, The Netherlands	Vandermeersch et al. 2015
*Mytilus edulis**	Blue mussel	45	/	3.5 per 10g		/	Fibres	300-1000µm	Belgium, The Netherlands	De Witte et al. 2014
*Mytilus edulis**	Blue mussel	36	/	0.36 (±0 .07) p/g		/	/	5-25µm	North Sea, Germany	Van Cauwenberghe & Janssen 2014
*Mytilus edulis**	Blue mussel	20	/	170-375 particles per 5 mussels		/	Fibres	/	Nova Scotia, Canada	Mathlon & Hill 2014
*Scapharca subcrenata**	Ark shell	6	100	45 (± 14.98)	/	PET, PA, PE	Fibres, fragments, pellets	<5mm	Fish market, China	Li et al. 2015
*Tegillarca granosa**	Blood cockle	18	100	5.33 (± 2.21)	/	PET, PA, PE	Fibres, fragments, pellets	<5mm	Fish market, China	Li et al. 2015

*Patinopecten yessoensis**	Yesso Scallop	6	100	57.17 (± 17.34)	/	PET, PA, PE	Fibres, fragments, pellets	<5mm	Fish market, China	Li et al. 2015
*Alectryonella plicatula**	Fingerprint oyster	18	100	10.78 (± 4.07)	/	PET, PA, PE	Fibres, fragments, pellets	<5mm	Fish market, China	Li et al. 2015
*Sinonovacula constricta**	Chinese razor clam	6	100	14.33 (± 5.35)	/	PET, PA, PE	Fibres, fragments, pellets	<5mm	Fish market, China	Li et al. 2015
*Ruditapes philippinarum**	Carpet shell	24	100	5.72 (± 2.86)	/	PET, PA, PE	Fibres, fragments, pellets	<5mm	Fish market, China	Li et al. 2015
*Meretrix lusoria**	Orient clam	18	100	9.22(± 0.46)	/	PET, PA, PE	Fibres, fragments, pellets	<5mm	Fish market, China	Li et al. 2015
*Cyclina sinensis**		30	100	4.82 (± 2.17)	/	PET, PA, PE	Fibres, fragments, pellets	<5mm	Fish market, China	Li et al. 2015
*Crassostrea gigas**	Pacific oyster	12	30	0.6±0.9	0-2	/	Fibres		USA	Rochman et al. 2015
*Crassostrea gigas**	Pacific oyster	11	/	0.47(± 0.16) per g		/	/	5-25 µm	Atlantic Ocean	Van Cauwenberghe & Janssen 2014
Phylum Arthrapoda										
Lepas spp. *	Gooseneck barnacle	385	33.5	/	01/30/16		/	<5mm	North Pacific	Goldstein & Goodwin 2013
Neocalanus cristatus	Calanoid copepod	960	/	1 particle per 34 zoop			Fibre, fragment	556 (149) µm	North Pacific	Desforges et al. 2015
Euphausia pacifica	Euphausid	413	/	1 particle per 7 euph			Fibre, fragment	816 (108) µm	North Pacific	Desforges et al. 2015
*Nephrops norvegicus**	Norway lobster	120	83	/			/		Clyde, UK	Murray and Cowie 2011
*Crangon crangon**	Brown shrimp	110	/	11.5 fibres per 10 g			95% fibres, 5% films	300-1000 µm	Belgium	Devriese et al. 2015
Phylum Annelida										
Arenicola marina	Lugworm			1.2 +- 2.8 g/ w.w				>5µm	Belgium, NL, France	Van Cauwenberge et al. in Devriese et al. 2015
Phylum Chaetognatha										
Parasagitta elegans	Arrow worm	1	100	/		PS	Spheres	0.1-3mm	New England, USA	Carpenter et al. 1972
Phylum Chordata										
Phoca vitulina	Harbour seal	100 stomachs 107	S:11.2 , I:1	Max: 8 items (s), 7 items (i)			Fragments	>0.1	The Netherlands	Bravo Rebolledo et al. 2013

		intestines								
Mesoplodon mirus	True's beaked whale	1	100	88			Fibres, fragment	mean 2.16mm	Connemara, Ireland	Lusher et al. 2015
Megaptera novaeangliae	Humpback whale	1	100	45 items			Fragments	1-17cm	The Netherlands	Besseling et al. 2015
Arctocephalus spp.	Fur seal	145	100	1-4 per scat			Fragments, beads	4.1mm	Macquarie Island, Australia	Eriksson & Burton 2003
*Chelonia mydas**	Green turtle	24	/	Total: 11 pellets			Pellets	<5mm	Rio Grande do Sul, Brazil	Tourinho et al. 2010
Menidia menidia	Atlantic silversides	9	33	/			PS	0.1-3mm	New England, USA	Carpenter et al 1972
*Atherinopsis californiensis**	Jacksmelt	7	28.5714 2857	1.6+-3.7			Fibres, fragments	0-10	USA	Rochman et al. 2015
Alepisaurus ferox	Longnosed lancetfish	144	24	2.7 (± 2.0)			Fragments	68.3 (±91.1)	North Pacific	Choy and Drazen 2013
Cololabis saira	Pacific saury	52	*35	3.2 (± 3.05)			Fragments	0--2	North Pacific	Boerger et al. 2010
*Clupea harengus**	Atlantic herring	2	100	1		PS	PS	0.1 -3mm	New England, USA	Carpenter et al 1972
*Clupea harengus**	Atlantic herring	566	2		1 to 4		Fragments	0.5-3	North Sea	Foekema et al. 2013
*Clupea harengus**	Atlantic herring	3	100	/			/	/	North Sea	Collard et al. 2015
*Sprattus sprattus **	European sprat	111	38.74%	0.88 (0.88)			Fibres, granual, film	0.1-4.9mm	Belgium, North Sea	Msc thesis: Zoeter Vanpoucke Mechtild
*Spratelloides gracilis**	Silverstripe round herring	4	40	1.1 +-1.7	0-5		0-5 fragments		Indonesia	Rochman et al. 2015
*Alosa fallax **	Twait shad	1	100	1			Fragment	<5mm	North Eastern Atlantic	Neves et al., 2015
*Sardina pilchardus**	European pilchard	3	100%	/			/	/	North Sea	Collard et al. 2015
*Sardina pilchardus**	European pilchard	99	19%	1.78 ± 0.7				<1mm	Adriatic sea	Avio et al. 2015
*Sadinella longicxeps**	Oil sardine	10	60%	/			Fibres	0.5-3mm	Mangalore	Sulochanan et al. 2014
*Stolephorus commersonnii**	Anchovy	16	37.5	/			Fragments	1.14-2.5	Alappuzha, India	Kripa et al. 2014
*Engraulis encrasiscolus**	Anchovy	3	100%	/			/	/	North Sea	Collard et al. 2015

*Engraulis mordax**	Pacific anchovy	10	30	0.3+-0.5	0-1		Fibres and film		USA	Rochman et al. 2015
*Pollachius virens**	Saithe	1	100	1		PS	PS	0.1-3mm PS	New England, USA	Carpenter et al 1972
Ciliata mustela	Five-bearded rocklings	113	0-10	/		PS	PS	2mm	Severn Estuary, UK	Kartar 1976
*Merlangius merlangus**	Whiting	105	6	01/03/16				1.7 (±1.5)	North Sea	Foekema et al. 2013
*Merlangius merlangus**	Whiting	50	32	1.75 (± 1.4)			Fragment, fibres, beads	2.2 (±2.3)	English Channel	Lusher et al. 2013
*Melanogrammus aeglefinus**	Haddock	97	6	1			Fragments	0.7 (±0.3)	North Sea	Foekema et al. 2013
*Gadus morhua**	Cod	80	13	01/02/16			Fragments	1.2 (±1.2)	North Sea	Foekema et al. 2013
*Micromesistius poutassou**	Blue whiting	27	51.9	2.07 (± 0.9)			Fragment, fibres, beads	2.0 (±2.4)	English Channel	Lusher et al. 2013
*Trisopterus minutus**	Poor cod	50	40	1.95 (± 1.2)			Fragment, fibres, beads	2.2 (±2.2)	English Channel	Lusher et al. 2013
*Merlucius merluciu*s*	Hake	3	100%	1.33 ± 0.57				<1mm	Adriatic sea	Avio et al. 2015
*Merlucius merlucius**	Hake	12	25%	0.33±0.65			4 fibres	<5mm	North Eastern Atlantic	Neves et al. 2015
Lampris sp. (*big eye*)		115	29	2.3 (± 1.6)			Fragments	49.1 (±71.1)	North Pacific	Choy & Drazen 2013
Lampris sp. (*small eye*)		24	5	5.8 (± 3.9)			Fragments	48.8 (±34.5)	North Pacific	Choy & Drazen 2013
*Lophius piscatorius**	Monkfish	2	50	0.5			1 fibre	<5mm	North Eastern Atlantic	Neves et al. 2015
Hygophum reinhardtii		45	*35	1.3 (± 0.71)			Fragments	1 – 2.79	North Pacific	Boerger et al. 2010
Loweina interrupta		28	*35	1			Fragments	1 – 2.79	North Pacific	Boerger et al. 2010
Myctophum aurolaternatum		460	*35	6.0 (± 8.99)			Fragments	1 – 2.79	North Pacific	Boerger et al. 2010
Symbolophorus californiensis		78	*35	7.2 (± 8.39)			Fragments	1 – 2.79	North Pacific	Boerger et al. 2010
Diaphus anderseni	Anderson's lanternfish	13	15.4	1			Fragments		North Pacific	Davison & Asch 2011
Diaphus fulgens		7	28.6	1			Fragments		North Pacific	Davison & Asch 2011
Diaphus phillipsi	Boluin's	1	100	1			Fragments	0.5	North Pacific	Davison & Asch

	lanternfish									2011
Lobianchia gemellarii	Coco's lanternfish	3	33.3	1			Fragments		North Pacific	Davison & Asch 2011
Myctophum nitidulum	Pearly lanternfish	25	16	1.5			Fragments	5.46	North Pacific	Davison & Asch 2011
Morone americana	White perch	12	33	/		PS	PS	0.1-3mm	New England, USA	Carpenter et al. 1972
Tautogolabrus adspersus	Bergall	6	< 83	/		PS	PS	0.1-3mm	New England, USA	Carpenter et al. 1972
Pomatoschistus minutus (As Gobius minutus)	Goby	200	0 – 25	/		PS	PS	2mm	Severn Estuary, UK	Kartar 1976
*Argyrosomus regius**	Meagre	5	60	0.80 (±0.8)			2 fragments, 2 fibres	<5mm	North Eastern Atlantic	Neves et al. 2015
Stellifer brasiliensis		330	9.2	0.33 – 0.83			Fragments	<1	Goiana Estuary, Brazil	Dantas et al. 2012
Stellifer stellifer		239	6.9	0.33 – 0.83			Fragments	<1	Goiana Estuary, Brazil	Dantas et al. 2012
Eugerres brasilianus		240	16.3	1–5			Fragments	1 – 5	Goiana Estuary, Brazil	Ramos et al. 2012
Eucinostomus melanopterus		141	9.2	1–5			Fragments	1 – 5	Goiana Estuary, Brazil	Ramos et al. 2012
Diapterus rhombeus		45	11.1	1–5			Fragments	1 – 5	Goiana Estuary, Brazil	Ramos et al. 2012
		7	71	5.+-5.2	0-24				Indonesia	Rochman et al. 2015
*Trachurus trachurus**	Horse mackerel	100	1	1			Fragments	2.52	North Sea	Foekema et al. 2013
*Trachurus trachurus**	Horse mackerel	44	7	0.07±0.25			2 fragments; 1 fiber	<5mm	North Eastern Atlantic	Neves et al. 2015
*Trachurus trachurus**	Horse mackerel	56	28.6	1.5 (± 0.7)			Fragment, fibres, beads	2.2 (±2.2)	English Channel	Lusher et al. 2013
*Trachurus picturatus**	Blue jack mackerel	29	3.00%	0.03±0.18			1 fibre	<5mm	North Eastern Atlantic	Neves et al. 2015
*Seriola lalandi**	Yellowtail amberjack	19	10.5	1			Fragments	0.5 – 11	North Pacific	Gassel et al. 2013
Decapyerus macrosoma	Shortfin scad	17	29	2.5 +- 6.3	0-21		Fragments and PS		Indonesia	Rochman et al. 2015
Callionymus lyra	Dragonette	50	38	1.79 (± 0.9)			Fragment, fibres, beads	2.2 (±2.2)	English Channel	Lusher et al. 2013
Cepola macrophthalma	Red band fish	62	32.3	2.15 (± 2.0)			Fragment, fibres, beads	2.0 (±1.9)	English Channel	Lusher et al. 2013

Morone saxatilis	Striped bass	7	28.5714 2857	0.9+- 1.2	0-3		Bibre, film, foam		USA	Rochman et al. 2015
*Mullus barbatus**	Red mullets	11	64%	1.57 ± 0.78				<1mm	Adriatic sea	Avio et al. 2015
*Mullus surmulletus**	Striped red mullet	4	100%	1.75±0.5			7 fibers	<5mm	North Eastern Atlantic	Neves et al. 2015
*Boops boops**	Bogue	32	9	0.09 (±0.3)			1 fragment, 2 fibres	<5mm	North Eastern Atlantic	Neves et al. 2015
*Dentex macrophthalmus**	Large-eye dentex	1	100	1			1 fibre	<5mm	North Eastern Atlantic	Neves et al. 2015
*Brama brama**	Atlantic pomfret	3	33	0.67±1.2			2 fibres	<5mm	North Eastern Atlantic	Neves et al. 2015
*Thunnus thynnus**	Bluefin tuna	34	32.40%	/				>0.63mm	Mediterranean	Romeo et al.2015
*Thunnus alalunga**	Albacore tuna	2	50.00%			PE		<3cm	Arabian Sea	Sajikumar et al. 2013
*Thunnus alalunga**	Albacore tuna	131	12.90%	/				>3.60mm	Mediterranean	Romeo et al.2015
*Rastrelliger kanagurta**	Indian Mackerel	10	50.00%	/			Fibres	0.5 -3mm	Mangalore	Sulochanan et al. 2014
*Rastrelliger kanagurta**	Indian Mackerel	9	56	1 (+- 1.1)	0-3		Fragments, pellets		Indonesia	Rochman et al. 2015
*Scomber japonicas**	Chub mackerel	35	31	0.57±1.04			14 fragments; 6 fibres	<9.42mm	North Eastern Atlantic	Neves et al. 2015
*Scomber scombrus**	Atlantic mackerel	13	31	0.46±0.78			3 fragments; 3 fibres	<5mm	North Eastern Atlantic	Neves et al. 2015
siganus argenteus	Streamlined spinefoot	2	50	0.5+-0.7			0-1 fragments		Indonesia	Rochman et al. 2015
Siganus canaliculatus	Rabbitfish	3	29	0.3-0.6			0-1 fragments		Indonesia	Rochman et al. 2015
*Xiphias gladius**	Swordfish	56	12.50%	/				>3.69mm	Mediterranean	Romeo et al.2015
*Pagellus acarne**	Axillary seabream	1	100	1			1 fiber	<5mm	North Eastern Atlantic	Neves et al., 2015
*Citharichthys sordidus**	Pacific sandab	5	60	1+-1.2	0-3		Fibre and dilm		USA	Rochman et al. 2015
*Pseudopleuronectes americanus**	Winter Flounder	95	2.1	/		PS	PS	0.1-3mm	New England, USA	Carpenter et al 1972
*Platichthys flesus**	Flounder	/	/	/		PS	PS	1mm	Severn Estuary, UK	Kartar 1973
*Platichthys flesus**	Flounder	1090	0 – 20.7	/		PS	PS	1mm	Severn Estuary, UK	Kartar 1976
Buglossidium luteum	Solenette	50	26	1.23 (± 0.4)			Fragment, fibres, beads	1.9 (±1.8)	English Channel	Lusher et al. 2013

Microchirus variegatus	Thickback sole	51	23.5	1.58 (± 0.8)			Fragment, fibres, beads	2.2 (±2.2)	English Channel	Lusher et al. 2013
*Oncorhynchus tshawytscha**	Chinook salmon	4	25	0.25+-0.5	0-1		Fibre		USA	Rochman et al. 2015
Myoxocephalus aenaeus	Grubby	47	4.2	/		PS	PS	0.1-3mm	New England, USA	Carpenter et al 1972
*Ophiodon elongates**	Ling cod	11	9.09090 9091	0.1+- 0.3	0-1		0-1 film		USA	Rochman et al. 2015
Liparis liparis liparis	Sea snails	220	0 – 25	/		PS	PS	1mm	Severn Estuary, UK	Kartar 1976
*sebastes flavidus**	Yellowtail rockfish	1	33	0.3+-0.6	0-1		Fibres		USA	Rochman et al. 2015
*Sebastes mystinus**	Blue rockfish	10	20	0.2+-0.4	0-1		Fibres		USA	Rochman et al. 2015
*Chelidonichthys cuculus**	Red gurnard	66	51.5	1.94 (± 1.3)			Fragments	2.1 (±2.1)	English Channel	Lusher et al. 2013
*Chelidonichthys lucernus**	Tub Gurnard	3	0.67	1 ± 0				<1mm	Adriatic sea	Avio et al. 2015
*Trigla lyra**	Piper gurnard	31	19	0.26±0.57			1 fragment; 7 fibers	<5mm	North Eastern Atlantic	Neves et al., 2015
Prionotus evolans	Striped searobin	1	100	1		PS	PS	0.1-3mm	New England, USA	Carpenter et al 1972
Cathorops spixii	Madamago sea catfish	60	18.3	0.47	1 – 4				Goiana Estuary, Brazil	Possatto et al. 2011
Cathorops spp		60	33.3	0.55	1 – 4				Goiana Estuary, Brazil	Possatto et al. 2011
Sciades herzbergii	Pemecoe catfish	62	17.7	0.25	1 – 4				Goiana Estuary, Brazil	Possatto et al. 2011
Astronesthes indopacificus		7	*35	1			Fragments	1 – 2.79	North Pacific	Boerger et al. 2010
Sternoptyx diaphana	Hatchetfish	4	25	1			Fragments	1.58mm	North Pacific	Davison & Asch 2011
Sternoptyx pseudobscura	Highlight hatchetfish	6	16.7	1			Fragments	4.75mm	North Pacific	Davison & Asch 2011
Idiacanthus antrostomus	Pacific black dragon	4	25	1			Fragments	0.5mm	North Pacific	Davison & Asch 2011
*Zeus faber**	John Dory	46	47.6	2.65 (± 2.5)			Fragment, fibres, beads	2.2 (±2.2) mm	English Channel	Lusher et al. 2013
*Zeus faber**	John Dory	1	100	1			Fibre	<5mm	North Eastern Atlantic	Neves et al. 2015

*Scyliorhinus canicula**	Lesser-spotted catshark	20	20	0.27 (±0.55)		1 fragment; 5 fibres	<5mm	North Eastern Atlantic	Neves et al. 2015
*Raja asterias**	Starry ray	7	43	0.57(±0.79)		4 fibres	<5mm	North Eastern Atlantic	Neves et al. 2015
*Squalus acanthias**	Spiny dogfish	9	44	1.25 (± 0.5)			<1mm	Adriatic sea	Avio et al. 2015

Table VI.3 Evidence of microplastic ingestion by seabirds mean (±SD unless * = SE).

Species	Common name	n	Percentage with plastic (%)	Mean number of particles p/ individual	Mean size ingested ± SD (min-max) (mm)	Type of plastic	Location	Source
Family Procellariidae								
(*Aphrodroma brevirostris*) (as Pterodroma brevirostris)	Kerguelen petrel	26	3.8	1		Pellets	North Island, New Zealand	Reed 1981
(*Aphrodroma brevirostris*) (as Pterodroma brevirostris)	Kerguelen petrel	13	8	0.2	Mass <0.0083g	Pellets	Gough Island, South Atlantic	Furness 1985a
Aphrodroma brevirostris (as Pterodroma brevirostris)	Kerguelen petrel	63	22.2	/	-	Pellets	Southern Ocean	Ryan 1987
Aphrodroma brevirostris	Kerguelen petrel	28	7	/	3-6mm	Fragments, pellets	Antarctica	Ainley et al. 1990
Calonectris diomedea	Cory's shearwater	7	42.8	/		Pellets	Southern Ocean	Ryan 1987
Calonectris diomedea	Cory's shearwater	147	24.5	Stomach= 2 Gizzard= 3.1		Beads	North Carolina, USA	Moser & Lee 1992
Calonectris diomedea	Cory's shearwater	5	100	/	<10		Rio Grande do Sul, Brazil	Colabuno et al 2009
Calonectris diomedea	Cory's shearwater	85	83	8 (± 7.9)	3.9 ± 3.5		Canary Islands, Spain	Rodríguez et al. 2012
Calonectris diomedea	Cory's shearwater	49	96	14.6 (± 24.0)	2.5 ± 6.0 [A]		Catalan coast, Mediterranean	Codina-García et al. 2013
Daption capense	Cape petrel	18	83.3	/		Pellets	Southern Ocean	Ryan 1987
Daption capense	Cape petrel	30	33	1	5		Ardery Island, Antarctica	Van Franeker & Bell 1988
Daption capense	Cape petrel	105	14	/	3-6mm	Fragments, pellets	Antarctica	Ainley et al. 1990
Fulmarus glacialis	Northern fulmar	3	100	7.6	1-4mm	Pellets	California, USA	Baltz & Morejohn 1976
Fulmarus glacialis	Northern fulmar	79	92	11.9		Pellets	Netherland and Arctic colonies	Van Franeker 1985

Fulmarus glacialis	Northern fulmar	8	50	3.9		Pellets	St. Kilda, UK	Furness 1985
Fulmarus glacialis	Northern fulmar	13	92.3	10.6		Pellets	Foula, UK	Furness 1985b
Fulmarus glacialis	Northern fulmar	1	100	1	4mm	Pellets	Oregon, USA	Bayer & Olson 1988
Fulmarus glacialis	Northern fulmar	44	86.4	Stomach = 3 Gizzard = 14	-	Beads	North Carolina, USA	Moser & Lee 1992
Fulmarus glacialis	Northern fulmar	19	84.2	Max: 26	-	Pellets	Alaska, USA	Robards et al. 1995
Fulmarus glacialis	Northern fulmar	3	100	7.7	-	Pellets	Eastern North Pacific	Blight & Burger 1997
Fulmarus glacialis	Northern fulmar	15	36	3.6 (± 2.7)	7 (± 4.0)		Davis Strait, Canadian Arctic	Mallory et al. 2006
Fulmarus glacialis	Northern fulmar	1295	95	14.6 (± 2.0*) – 33.2(± 3.3*)	>1.0		North Sea	Van Franeker et al. 2011
Fulmarus glacialis	Northern fulmar	67	92.5	36.8 (± 9.8*)	>0.5		Eastern North Pacific	Avery-Gomm et al. 2012
Fulmarus glacialis	Northern fulmar	58	79	6.0 (± 0.9*)	>1.0		Westfjords, Iceland	Kühn & van Franeker 2012
Fulmarus glacialis	Northern fulmar	176	93	26.6 (± 37.5)		Fragments, pellets	Nova Scotia, Canada	Bond et al. 2014
Fulmarus glacialoides	Antarctic fulmar	84	2	/	2-6mm	Fragments, pellets	Antarctica	Ainley et al. 1990
Fulmarus glacialoides	Antarctic fulmar	9	79	/	<10		Rio Grande do Sul, Brazil	Colabuno et al 2009
Halobaena caerulea	Blue petrel	27	100	/		Pellets	New Zealand	Reed 1981
Halobaena caerulea	Blue petrel	74	85.1	/		Pellets	Southern Ocean	Ryan 1987
Halobaena caerulea	Blue petrel	62	56	/	3-6mm	Fragments, pellets	Antarctica	Ainley et al. 1990
Pachyptila spp.	Prions	/	/	/		Pellets	Gough Island, South Atlantic	Bourne & Imber 1982
(*Pachyptila salvini*)	Salvin's prion	663	20	/	2.5-3.5mm	Pellets	Wellington, New Zealand	Harper & Fowler 1987
Pachyptila salvini		31	51.6	/		Pellets	Southern Ocean	Ryan 1987

Pachyptila belcheri)	Thin-billed prion	152	6.6	/	2.5-3.5mm	Pellets	Wellington, New Zealand	Harper & Fowler 1987
Pachyptila belcheri	Thin-billed prion	32	68.7	/		Pellets	Southern Ocean	Ryan 1987
Pachyptila vittata	Broad-billed prion	31	39	0.6	Max mass: 0.066g	Pellets	Gough Island, South Atlantic	Furness 1985a
Pachyptila vittata	Broad-billed prion	310	16.5	/	2.5-3.5mm	Pellets	Wellington, New Zealand	Harper and Fowler 1987
Pachyptila vittata	Broad-billed prion	137	20.4	/		Pellets	Southern Ocean	Ryan 1987
Pachyptila vittata	Broad-billed prion	69	10	/	3-6mm	Fragments, pellets	Antarctica	Ainley et al. 1990
Pachyptila vittata	Broad-billed prion	149	/	1987-89 [B]1.73 ± 3.58		Pellets	Southern Ocean	Ryan 2008
Pachyptila vittata	Broad-billed prion	86	/	1999 [B]2.93 ± 3.80		Pellets	Southern Ocean	Ryan 2008
Pachyptila vittata	Broad-billed prion	95	/	2004 [B]2.66 ± 5.34		Pellets	Southern Ocean	Ryan 2008
Pachyptila desolata	Antarctic prion	35	14.3	/	2.5-3.5mm	Pellets	Wellington, New Zealand	Harper and Fowler 1987
Pachyptila desolata	Antarctic prion	88	47.7	/		Pellets	Southern Ocean	Ryan 1987
Pachyptila desolata	Antarctic prion	2	100	1	6-8.1mm		Heard Island, Australia	Auman et al. 2004
Pachyptila turtur	Fairy prion	105	96.2	/	2.5-3.5mm	Pellets	Wellington, New Zealand	Harper and Fowler 1987
Pagodroma nivea	Snow petrel	363	1	/	3-6mm	Fragments, pellets	Antarctica	Ainley et al. 1990
Procellaria aequinoctialis	White-chinned petrel	193	/	1983-1985 [B]1.66 (± 3.04)		Pellets	Southern Ocean	Ryan 1987, 2008
Procellaria aequinoctialis	White-chinned petrel	526	/	2005-2006 [B]1.39 (± 3.25)		Pellets	Southern Ocean	Ryan 2008
Procellaria aequinoctialis	White-chinned petrel	41	/	/	<10		Rio Grande do Sul, Brazil	Colabuno et al. 2009

Procellaria aequinoctialis	White-chinned petrel	34	44	/	<10		Rio Grande do Sul, Brazil	Colabuno et al. 2010
Procellaria conspicillata	Spectacled petrel	3	33	/	<10		Rio Grande do Sul, Brazil	Colabuno et al. 2010
Procellaria conspicillata	Spectacled petrel	9	/	/	<10		Rio Grande do Sul, Brazil	Colabuno et al. 2009
Pseudobulweria rostrata	Tahiti petrel	121	<1	1		Fragments	Tropical, North Pacific	Spear et al. 1995
Pterodroma incerta	Atlantic petrel	13	8	0.1	Max mass: 0.0053g	Pellets	Gough Island, South Atlantic	Furness 1985a
Pterodroma incerta	Atlantic petrel	20	5	/		Pellets	Southern Ocean	Ryan 1987
Pterodroma macroptera	Great-winged petrel	13	7.6	/		Pellets	Southern Ocean	Ryan 1987
Pterodroma mollis	Soft-plumaged petrel	29	20.6	/		Pellets	Southern Ocean	Ryan 1987
Pterodroma mollis	Soft-plumaged petrel	18	6	0.1	0.014g	Pellets	Gough Island, South Atlantic	Furness 1985a
Pterodroma externa	Juan Fernández petrel	183	< 1	1	3-5mm	Pellets	Offshore, North Pacific	Spear et al. 1995
Pterodroma cervicalis	White-necked petrel	12	8.3	5	3-4mm	Fragments	Offshore, North Pacific	Spear et al. 1995
Pterodroma pycrofti	Pycroft's petrel	5	40	2.5 (± 0.7)	3-5mm	Fragments and pellets	Offshore, North Pacific	Spear et al. 1995
Pterodroma leucoptera	White-winged petrel	110	11.8	2.2 (± 3.0)	2-5mm	Fragments	Offshore, North Pacific	Spear et al. 1995
Pterodroma brevipes	Collared petrel	3	66.7	1	2-5mm		Offshore, North Pacific	Spear et al. 1995
Pterodroma nigripenni	Black-winged petrel	66	4.5	3.0 (± 3.5)	3-5mm	Fragments	Offshore, North Pacific	Spear et al. 1995
Pterodroma longirostris	Stejneger's petrel	46	73.9	6.8 (± 8.6)	2-5mm	Fragments and pellets	Offshore, North Pacific	Spear et al. 1995

Puffinus Ilherminieri	Audubon's shearwater	119	5	Stomach = 1 Gizzard = 4.4		Beads	North Carolina, USA	Moser & Lee 1992
Puffinus assimilis	Little shearwater	13	8	0.8	Max mass: 0.12g	Pellets	Gough Island, South Atlantic	Furness 1985a
Puffinus bulleri	Buller's shearwater	3	100	8.5 (± 8.6)	2-8mm	Fragments and pellets	Tropical, North Pacific	Spear et al. 1995
Puffinus creatopus	Pink-footed shearwater	5	20	2.2	1-4mm	Pellets	California, USA	Baltz and Morejohn 1976
Puffinus gravis	Great shearwater	24	100	/		Beads	Briar Island, Nova Scotia	Brown et al. 1981
Puffinus gravis	Great shearwater	13	85	12.2	Max mass: 1.13g	Pellets	Gough Island, South Atlantic	Furness 1985a
Puffinus gravis	Great shearwater	55	63.6	Stomach = 1 Gizzard = 13		Beads	North Carolina, USA	Moser and Lee 1992
Puffinus gravis	Great shearwater	50	66	1983-1985 [B]16.5(± 19.0)		Pellets	Southern Ocean	Ryan 1987, 2008
Puffinus gravis	Great shearwater	53	/	2005-2006 [B]11.8 (± 18.9)		Pellets	Southern Ocean	Ryan 2008
Puffinus gravis	Great shearwater	19	89	/	<10 mm		Rio Grande do Sul, Brazil	Colabuno et al. 2009
Puffinus gravis	Great shearwater	6	100	/	<3.2-5.3mm	Pellets	Rio Grande do Sul, Brazil	Colabuno et al. 2010
Puffinus gravis	Great shearwater	84	88	11.8 (± 16.9)		Fragments and pellets	Nova Scotia, Canada	Bond et al. 2014
Puffinus griseus	Sooty shearwater	21	43	5.05	1-4mm	Pellets	California, USA	Baltz and Morejohn 1976
Puffinus griseus	Sooty shearwater	5	100	/	Beads	Beads	Briar Island, Nova Scotia, Canada	Brown et al. 1981
Puffinus griseus	Sooty shearwater	36	58.3	11.4 (± 12.2)	3-20mm	Fragments and pellets	Tropical, North Pacific	Spear et al. 1995
Puffinus griseus	Sooty shearwater	218	88.5	/		Pellets	Offshore, North Pacific	Ogi et al. 1990

Puffinus griseus	Sooty shearwater	20	75	3.4		Pellets	Offshore eastern North Pacific	Blight and Burger 1997
Puffinus griseus	Sooty shearwater	50	72	2.48 (± 2.7)		Fragments and pellets	Nova Scotia, Canada	Bond et al. 2014
Puffinus mauretanicus	balaric shearwater?	46	70	2.5 (± 2.9)	3.5 (± 10.5[A])		Catalan coast, Mediterranean	Codina-García et al. 2013
Puffinus nativitatis	Christmas shearwater	5	40	1	3-5mm	Fragments and pellets	Tropical, North Pacific	Spear et al. 1995
Puffinus pacificus	Wedge-tailed shearwater	23	4	2.5 (± 2.1)		Fragments and pellets	Tropical, North Pacific	Spear et al. 1995
Puffinus pacificus dark phase	Wedge-tailed shearwater	62	24.2	3.5 (± 2.7)		Fragments and pellets	Tropical, North Pacific	Spear et al. 1995
Puffinus pacificus	Wedge-tailed shearwater	20	60	max: 11	Pellets 2-4mm	Pellets	Hawaii	Fry et al. 1987
Puffinus puffinus	Manx shearwater	10	30	0.4		Pellets	Rhum, UK	Furness 1985b
Puffinus puffinus	Manx shearwater	25	60	/	<10 mm		Rio Grande do Sul, Brazil	Colabuno et al. 2009
Puffinus puffinus	Manx shearwater	6	17	/		Fragments	Rio Grande do Sul, Brazil	Colabuno et al. 2010
Puffinus tenuirostris	Short-tailed shearwater	6	100	19.8	1-4mm	Pellets	California, USA	Baltz and Morejohn 1976
Puffinus tenuirostris	Short-tailed shearwater	324	81.8	/		Pellets	Offshore, North Pacific	Ogi et al. 1990
Puffinus tenuirostris	Short-tailed shearwater	330	83.9	5.8 (± 0.4*)	2-5mm	Pellets	Bering Sea, North Pacific	Vlietstra and Parga 2002
Puffinus tenuirostris	Short-tailed shearwater	5	80	/		Fragments and pellets	Alaska, USA	Robards et al. 1995
Puffinus tenuirostris	Short-tailed shearwater	99	100	15.1 (± 13.2)	>2mm		Offshore, North Pacific	Yamashita et al. 2011
Puffinus tenuirostris	Short-tailed shearwater	129	67	Adults: 4.5	0.97-80.8mm	Fragments	North Stradbroke Island, Australia	Acampora et al. 2013

				Juvenile: 7.1			
Puffinus tenuirostris	Short-tailed shearwater	12	100	27	>2mm	Offshore, North Pacific	Tanaka et al. 2013
Puffinus yelkouan	Yelkouan shearwater	31	71	4.9 (± 7.3)	4.0 (± 13.0 [A])	Catalan coast, Mediterranean	Codina-García et al. 2013
Antarctic petrel (*Thalassoica antarctica*)		184	< 1	/	Fragments, pellets 3-6mm	Antarctica	Ainley et al. 1990
Family Hydrobatidae							
Fregetta grallaria	White-bellied storm petrel	13	38	1.2	Pellets Max mass: 0.042g	Gough Island, UK South Atlantic	Furness 1985a
Fregetta grallaria	White-bellied storm petrel	296	< 1	1	Fragment	Offshore, North Pacific	Spear et al. 1995
Fregetta grallaria	White-bellied storm petrel	318	/	1987-89 [B]0.63 ± 1.13	Pellets 33.3%	Southern Ocean	Ryan 2008
Fregetta grallaria	White-bellied storm petrel	137	/	1999 [B]0.63 ± 1.37	Pellets 20.9%	Southern Ocean	Ryan 2008
Fregetta grallaria	White-bellied storm petrel	95	/	2004 [B]0.72 ± 1.87	Pellets 16.2%	Southern Ocean	Ryan 2008
Garrodia nereis	Grey-backed storm petrel	11	27	0.3	Pellets: Max mass: 0.010g	Gough Island, UK South Atlantic	Furness 1985a
Garrodia nereis	Grey-backed storm petrel	12	8.3	/	Pellets	Southern Ocean	Ryan 1987
Oceanodroma furcata	Fork-tailed storm petrel	/	/	/	<5mm	Aleutian Islands, USA	Ohlendorf et al. 1978
Oceanodroma furcata	Fork-tailed storm petrel	21	85.7	Max: 12	Pellets 22%	Alaska, USA	Robards et al. 1995
Oceanodroma furcata	Fork-tailed storm petrel	7	100	20.1	Pellets 16%	Eastern North Pacific	Blight and Burger 1997

Oceanodroma leucorhoa	Leach's storm petrel	15	40	1.66 (± 1.2)	2-5mm	Newfoundland, Canada	Rothstein 1973
Oceanodroma leucorhoa	Leach's storm petrel	17	58.8	2.9	Pellets	St. Kilda, Scotland, UK	Furness 1985b
Oceanodroma leucorhoa	Leach's storm petrel Leach's storm petrel	354	19.8	3.5 (± 2.6)	Fragments, pellets 2-5mm	Offshore, North Pacific	Spear et al. 1995
Oceanodroma leucorhoa	Leach's storm petrel	64	48.4	Max: 13	Monofilament line, fragments, pellets	Alaska, USA	Robards et al. 1995
Oceanites oceanicus	Wilson's storm petrel	20	75	4.4	2.9mm	Ardery Island, Antarctica	van Franeker and Bell 1988
Oceanites oceanicus	Wilson's storm petrel	91	19	/	Fragments, pellets 3-6mm	Antarctica	Ainley et al. 1990
Oceanites oceanicus	Wilson's storm petrel	133	38.3	Stomach = 1.4 Gizzard = 5.4	26% beads	North Carolina, USA	Moser and Lee 1992
Pelagodroma marina	White-faced storm petrel	19	84	11.7	Pellets Max mass: 0.34g	Gough Island, UK South Atlantic	Furness 1985a
Pelagodroma marina	White-faced storm petrel	15	73.3	13.2 ± 9.5	Pellets 2-5mm	Offshore, North Pacific	Spear et al. 1985
Pelagodroma marina	White-faced storm petrel	24	20.8	/	Pellets 41%	Southern Hemisphere	Ryan 1987
Pelagodroma marina	White-faced storm petrel	253		1987-89 [B]3.98 ± 5.45	Pellets 69.6%	Southern Ocean	Ryan 2008
Pelagodroma marina	White-faced storm petrel	86	/	1999 [B]4.06 ± 5.93	Pellets 37.5%	Southern Ocean	Ryan 2008
Pelagodroma marina	White-faced storm petrel	5	/	2004 [B]2.52 ± 4.43	Pellets 13.5%	Southern Ocean	Ryan 2008
Family Diomedeidae							

Phoebetria fusca	Sooty albatross	73	42.7	/	Pellets 34%	Southern Ocean	Ryan 1987
Phoebastria immutabilis)	Laysan albatross	/	52	/	Pellets 2-5mm	Hawaiian Islands, USA	Sileo et al. 1990
Phoebastria nigripes	Black-footed albatross	/	12	/	Pellets 2-5mm	Hawaiian Islands, USA	Sileo et al. 1990
Phoebastria nigripes (As *Diomedea nigripes)*	Black-footed albatross	3	100	5.3	Pellets 50%	Offshore, eastern North Pacific	Blight and Burger 1997
Thalassarche melanophri	Black-browed albatross	2	100	3	Pellets 50%	Rio Grande do Sul, Brazil	Tourinho et al. 2010
Order Charadriiformes Family Laridae							
Larus audouinii	Audouin's gull	15	13	49.3 (± 77.7)	2.5 (± 5.0*)	Catalan coast, Mediterranean	Codina-García et al. 2013
Larus glaucescens	Glaucous-winged gull	589 boluses	12.2	/	<10mm	Protection Island, USA	Lindborg et al. 2012
Larus heermanni	Heermann's Gull	15	7	1	Pellets 1-4mm	California, USA	Baltz and Morejohn 1976
Larus melanocephalus	Mediterranean gull	4	25	3.7 (± 7.5)	3.0 (± 5.0*)	Catalan coast, Mediterranean	Codina-García et al. 2013
Larus michahellis	Yellow-legged gull	12	33	0.9 (± 1.5)	2.0 (± 8.0*)	Catalan coast, Mediterranean	Codina-García et al. 2013
Rissa brevirostris	Red-legged kittiwake	15	26.7	/	Pellets: Mean 5.87mm	Alaska, USA	Robards et al. 1995
Rissa tridactyla	Black-legged kittiwake	8	8	4	Pellets 1-4mm	California, USA	Baltz and Morejohn 1976
Rissa tridactyla	Black-legged kittiwake	256	7.8	Max: 15	Pellets	Alaska, USA	Robards et al. 1995

Rissa tridactyla	Black-legged kittiwake	4	50	1.2 (± 1.9)	3.0 (± 5.0*)	Catalan coast, Mediterranean	Codina-García et al. 2013
Family Alcidae							
Aethia psittacula	Parakeet auklet	/	/	/	<5mm	Aleutians Islands, USA	Ohlendorf et al. 1978
Aethia psittacula	Parakeet auklet	208	93.8	17.1	Pellets 4.08mm	Alaska, USA	Robards et al. 1995
Fratercula cirrhata	Tufted puffin	489	24.5	Max: 51	Pellets 4.10mm	Alaska, USA	Robards et al. 1995
Fratercula cirrhata	Tufted puffin	9	89	3.3	Pellets	Offshore, North Pacific	Blight & Burger 1997
Fratercula corniculata	Horned puffin	/	/	/	<5mm	Aleutian Islands, USA	Ohlendorf et al. 1978
Fratercula corniculata	Horned puffin	120	36.7	Max: 14	Pellets 5.03mm	Alaska, USA	Robards et al. 1995
Fratercula corniculata	Horned puffin	2	50	1.5	Pellets	Offshore, North Pacific	Blight and Burger 1997
Uria aalge	Common murre	1	100	2011 – 2012 1	6.6 (± 2.2)	Newfoundland, Canada	Bond et al. 2013
Uria lomvia	Thick-billed murre	186	11	0.2 (± 0.8)	4.5 (± 3.8)	Canadian Arctic	Provencher et al. 2010
Uria lomvia	Thick-billed murre	3	100	2011 – 2012 1	6.6 (± 2.2)	Newfoundland, Canada	Bond et al. 2013
Uria lomvia	Thick-billed murre	1249	7.7	1985 – 1986 0.14 (± 0.7*)	10.1 (± 7.4)	Newfoundland, Canada	Bond et al. 2013
Family Stercorariidae							
Stercorarius antarcticus) (as *Catharacta antarcticu)*	Brown skua	494	22.7	/	Pellets 67%	Southern Ocean	Ryan 1987
Stercorarius hamiltoni (as *Catharacta*	Tristan skua	11	9	0.3	Pellets	Gough Island, UK	Furness 1985a

hamiltoni)				Max: 3	Max mass: 0.064g	South Atlantic	
Stercorarius longicaudus	Long-tailed skua	2	50	5	Fragments, pellets	Eastern North Pacific	Spear et al. 1995
Stercorarius parasiticu)	Arctic skua	2	50	/	Pellets 50%	Southern Ocean	Ryan 1987
Family Scolopacidae							
Phalaropus fulicarius	Grey phalarope	20	100	Max: 36	Beads 1.7-4.4mm	California, USA	Bond 1971
Phalaropus fulicarius	Grey phalarope	7	85.7	5.7	Pellets	California, USA	Connors and Smith 1982
Phalaropus fulicarius	Grey phalarope	2	50	/	Pellets	Southern Ocean	Ryan 1987
Phalaropus fulicarius	Grey phalarope	55	69.1	Stomach = 1 Gizzard = 6.7	Beads 16.7%	North Carolina, USA	Moser and Lee 1992
Phalaropus lobatus)	Red-necked phalarope	36	19.4	Stomach = 0 Gizzard = 3.7	Beads 16.7%	North Carolina, USA	Moser and Lee 1992
Family Sternidae							
Onychoprion fuscatus	Sooty tern	64	1.6	2	Pellets 4mm	Offshore, eastern North Pacific	Spear et al. 1995
Gygis alba	White tern	8	12.5	5	Fragments 3-4mm	Offshore, eastern North Pacific	Spear et al. 1995
Order Suliformes							
Family Phalacrocoracidae							
Phalacrocorax atriceps purpurascens	Macquarie shag	[C]64	7.8	1 per bolus	Polystyrene spheres	Macquarie Island, Australia	Slip et al. 1990

Annex VII. Estimated cost of marine litter for the EU fishery sector

Table VII.1. Estimated cost of marine litter for the EU fishery sector (based on Mouat et al. 2010 in Arcadis 2014)

Type of cost	**Cost per vessel (€)**	**Estimated cost for the EU (M€)**	**Calculation method**
Reduced catch revenues (contamination forces fishermen to use more time for the selection of their catches and to discard part of them)	2,340	28.64	The cost estimated by Mouat et al. (2010) for Scottish vessels (€2,200 per vessel per year), actualised in 2013 prices, was multiplied by the number of EU trawlers (EU vessels that use seafloor fishing gear), i.e. 12,238.
Removing litter from fishing gear	959	11.74	The time needed to remove litter from fishing gear, as estimated by Mouat et al (2010) for Scottish vessels (41 hours per vessel per year), was multiplied by the average EU27 labour cost (€23.4 per hour) and then by the number of EU trawlers (EU vessels that use seafloor fishing gear), i.e. 12,238.
Broken gear, fouled propellers	191	16.79	The cost related to broken fear and fouled propellers, as estimated by Mouat et al. (2010) for Scottish vessels (€180 per vessel per year), actualised in 2013 prices was multiplied by the total number of fishing vessels in the EU (87,667 according to Eurostat).
Cost of rescue services	52	4.54	The average cost of incidents around the British Isles attended by the Royal National Lifeboat Institution (RNLI) in 1998 (£4,000 per vessel) was multiplied by the number of incidents (200), and divided by the number of UK fishing boats (7,800), as indicated by Fanshawe (2002). The estimated yearly cost per boat resulting by this calculation was then multiplied by 31.1%, i.e. the share of rescue operation dedicated to fishing vessels, as indicated for the UK by Mouat et al (2010) (year 2008). The result (£32 per vessel) was then actualised in 2013 prices and converted to € and multiplied by the total number of fishing vessels in the EU (87,667 according to Eurostat).
Total		**61.71**	

Annex VIII. Estimated clean-up and management costs of marine litter

Table VIII.1 Estimated clean-up and management costs of marine litter – some examples

Country / Region	Estimated cost at national and municipality level	Source
Belgium and Netherlands	USD 13.8 million (EUR 10.4 million) for all municipalities in Belgium and Netherlands (ave. USD 264 885/municipality/year (EUR 200 000/municipality/ year; EUR 629 – 97 346 per km)) Costs are higher for areas with high visitor numbers; for example the Den Haag Municipality spends USD 1.43 million/year (EUR 1.27 million/year) with costs for processing litter (including transport) about USD 229/tonne (EUR 165/tonne).	Mouat et al, 2010 OSPAR 2009
Peru	USD 2.5 million in labour costs (ave. USD 400 000/year in municipality of Ventanillas)	Alfaro, 2006 cited in UNEP, 2009
UK	USD 24 million (EUR 18 million) (ave. USD 193 365/municipality/year (EUR 146,000/municipality/ year) (per km cleaning costs range from USD 226-108 600/km/year (EUR 171-82 000/km/year)). Specific municipality costs: • Suffolk: approx. USD 93 500/year (GBP 60 000/year) on 40km of beaches • Carrick District Council (Devon): approx. USD 56 000/year (GBP 32 000/year) on 5km of beaches. • Studland (Dorset): USD 54 000/year (GBP 36,000/year) to collect 12-13 tonnes of litter each week in the summer along 6km of beaches. • Kent coastline: direct and indirect cost of litter estimated at over USD 17 million/year (GBP 11 million/year). • Annual expenditure on beach cleaning in 56 local authorities ranged from USD 23/km (GBP 15/km) in West Dunbartonshire to USD 78,000/km (GBP 50 000/km) in Wyre.	Mouat et al, 2010 Fanshawe and Everard, 2002 OSPAR 2009
Bay of Biscay and Iberian coast	A Spanish council with 30 beaches (5 Blue Flags) spends around USD 111 000/year (EUR 80 000/year) on beach cleaning A French council with 30 beaches (5 Blue Flags) spends around USD 556 000/year (EUR 400 000/year) on 'beach caring' (including beach clearing, monitoring of buoys, coastguards etc.), of which around 20% (USD 111 000 (EUR 80 000)) relates to beach clearing. In Landes, the cost of cleaning up 108km of sandy beaches was USD 11 million (EUR 8 million) between 1998 and 2005 Cost of beach cleaning between USD 6 250-69 460/year/council (EUR 4 500-50 000/year/council) corresponding to average cost of USD 9 000/km (EUR 6 500/km) of cleaned beach/year.	OSPAR, 2009
Poland	Beach cleaning and removing litter from harbour waters cost USD 792 000 (EUR 570 000) in 2006 (same amount also spent in five communes and two ports)	(UNEP, 2009)
Oregon, California, Washington (USA)	Annual combined expenditure of USD 520 million (USD 13/resident/year) to combat litter and curtail potential marine litter	Stickel et al., 2012
APEC region	USD 1 500/tonne of marine litter in 2007 terms	(McIlgorm, 2009)

Annex IX Compilation of Eleven Best Practices in European Seas (evaluated using the DeCyDe-4-MARLISCO tool)

	Title	Implementation area	Implementation scale	Duration (y)	Theme(s)	Type of initiative[1]
1	Operation clean coasts 'Calanques Propres'	France	Sub-national	>5	Mitigation Awareness	Campaign P-A-A
2	Responsible snack bar project	Spain	National	0-1	Prevention	Econ./Market instrument
3	Sea surface marine litter cleaning operation	Turkey	Sub-national	>5	Mitigation	P-A-A
4	Integrated action plan for the cleaning of the Channel coast	France	Sub-national	>5	Prevention Mitigation Awareness	P-A-A campaign
5	The plastic bag levy	Ireland	National	>5	Prevention	Policy/Reg. Impl. Econ./Market instrument
6	Coastwatch Portugal campaign	Portugal	National	>5	Mitigation Awareness	Campaign
7	Fishing for litter	Netherlands	Sub-national	2-5	Mitigation Awareness	P-A-A
8	Blue lid campaign	Turkey	National	1-2	Awareness	P-A-A campaign
9	Separation and recycling of materials from fishing nets and trawls	Denmark	National	>5	Prevention Mitigation	P-A-A other
10	BREF – best available techniques reference document – in common wastewater and waste gas treatment/management systems in the chemical sector	Europe	European	>5	Prevention	Policy/Reg. Impl.
11	Dive against debris, project AWARE	Global	Global	>5	Mitigation	P-A-A campaign

[1] Key to type of initiative: P-A-A – Practice/Activity/Action; Policy/Reg. Impl. – policy/regulation implementation; Econ./Market Instrument – economic and market-based instruments.

Annex X. Sampling and analysis techniques for microplastics

Microplastics in Sediments

A wide range of sampling techniques are used for monitoring microplastics in sediments reviewed in Hidalgo-Ruz et al. (2012), van Cauwenberghe et al. (2013) and Rocha-Santos and Duarte (2015). These methods include density separation, filtration and/or sieving (Hidalgo-Ruz et al. 2012, Rocha-Santos and Duarte 2015). Also, to facilitate the plastic extraction among organics components such as organic debris (shell fragments, small organisms, algae or sea grasses, etc.) and other items such as pieces of tar, other methods can be applied, such as enzymatic, CCL_4 or H_2O_2 digestion of organic materials have been proposed (Galgani et al. 2011, Hidalgo-Ruz et al. 2012, Cole et al. 2014) such as for water samples.

The most common approach is to extract plastic particles from the sediment using a density separation based on the differences in density between plastic and sediment particles. Typically, this is achieved by agitating the sediment sample in concentrated sodium chloride (NaCl) solution. However, as the density of the NaCl solution is only 1.2 g cm^3, only low density plastics will float to the surface and can hence be extracted. Different authors have addressed this issue by using different salt solutions to obtain higher densities. Corcoran et al. (2009)) used a 1.4 g cm^{-3} polytungstate solution, Imhof et al. (2013) extracted microplastics from sediments using zinc chloride ($ZnCl_2$, 1.5-1.7 g cm^3), while others (Dekiff et al. 2014, Van Cauwenberghe et al. 2013a, Van Cauwenberghe et al. 2013b) used a sodium iodide (NaI, 1.6 -1.8 g cm^3) solution. These modifications result in an increased extraction efficiency for high density microplastics such as polyvinylchloride (PVC, density 1.14 - 1.56 g cm^3) or polyethylene terephthalate (PET, density 1.32-1.41 g cm^3). As these high-density plastics make up over 17% of the global plastic demand (PlasticsEurope 2013), not including these types of microplastics can result in a considerable underestimation of microplastic abundances in sediments. Especially as these high-density plastics are the first to settle and incorporate into marine sediments.

Sieves used in separation of particles usually have mesh sizes ranging from 38µm to 5 mm and often include 330µm, 1mm and 2mm. To avoid degradation, plastics separated from the sample have been dried and kept in the dark, however this step is probably unnecessary if samples are examined within a few months of collection.

Visual examination is the most common method to assess size and quantities of microplastics. Various imaging approaches, such as zooscan™ (Gilfillan 2009) or semi-automated methods (flow/cytometer, cell sorter, coulter counters) may be practical for the visualization or counting of microplastic particles, with the potential to enable a large number of samples to be analysed. For a better identification of plastics, specific criteria can be applied, such as the presence of cellular or organic structures, the constant thickness of fragments or fibres, homogeneous colours and plastic brightness. However, the reliability of such approaches has not been evaluated. Other analyses based on visual examination with light, polarised or not, or electron microscopy, may provide higher resolution but cannot be used to determine polymer type.

The choice of sampling strategy and sampling approach (reviewed by (Hidalgo-Ruz et al. 2012) will eventually determine the unit in which observed abundances will be reported. While a simple conversion can sometimes be made to compare among studies (Lusher et al. 2015), comparison is often impossible or requires assumptions that lead to biased results. Studies sampling an area (using quadrants) will often report abundances per unit of surface ($m^{-2)}$; e.g. (Martins and Sobral 2011). If real bulk samples up to a specific depth are taken the reporting unit is m^3 (e.g. (Turra,et al. 2014)). Conversion between these types of abundances is possible, if sufficient information is available on sampling depth. Yet, for 20% of the studies this is not the case as reported sampling depths can range from 0 to 50 cm. Other widely used reporting units are volume (mL to L; e.g. Noren 2007) or weight (g to kg; e.g. Claessens et al., 2011, Ng and Obbard 2006). Conversion between these two types of units is not straight forward. Detailed information on the density of the sediment is required. As this is never (as far as we could establish) reported in microplastic studies, assumptions have to be made. For example, the conversion of microplastic abundances in sediment (Claessens et al. 2011). Additionally, within studies reporting weight, a distinction can be made among those reporting wet (sediment) weight and those reporting dry weight. This adds to the constraints of converting from weight to volume units, or vice versa. Sediment samples from different locations or even different zones on one beach have different water content. Therefore, a (limited) number of authors choose to express microplastic abundance per sediment as dry weight to eliminate this variable (Claessens et al. 2013, Dekiff et al. 2014, Ng and Obbard 2006, Van Cauwenberghe et al. 2013); (Vianello et al. 2013).

Microplastics in Biota

In terms of monitoring and with regards to "in situ" experiments, one of the most important aspects is the choice of target species. It is important to consider (i) the exposure to plastics, especially for the species that are living at the surface or in the sediments, (ii) the ingestion rate, especially for filter feeders such as bivalves, (iii) the significance of results which vary depending on whether environmental impact or human health is considered, (iv) the biological sensitivity of certain species, such as the high retention rate in birds of the procellariform family, and (v) a large distribution and easy sampling of the target species.

Biological sampling that involves the examination and characterisation of plastic fragments consumed by marine organisms has been used for fishes (Lusher et al. 2013, Choy and Drazen 2013, Avio, Gorbi et al. 2015), invertebrates (Browne et al. 2008, Murray and Cowie 2011, Desforges et al. 2015, Van Cauwenberghe et al.,2015) and birds ((van Franeker et al. 2011). In general, the research question addressed will greatly influence which sampling and extraction technique to use. For example, size range of microplastics can be related to the micro- and macro-plankton highlighting the potential for microplastic ingestion by a wide variety of organisms (Hidalgo-Ruz et al. 2012). Thus, the sampling scale and methodology will depend on the size of the particle or the size group of the studied organisms. However, harmonisation of sampling and extraction techniques should be adopted for monitoring purposes.

The methodological difficulties in isolation protocols partly explain why only a few studies specifically addressed the occurrence of microplastics in marine organisms. Even though suitable methods have been identified for sediment and water samples, the extraction and quantification of microplastics from organisms may be masked within biological material and tissues. Protocols on the extraction of microplastics from marine invertebrates after a pre-digestion of organic matter have been proposed (Claessens, Van Cauwenberghe et al. 2013), indicating the importance of solvent properties and pH for sample treatment, affecting both the estimation and the characterization of the polymers by FT-IR. The enzymatic digestion of organic matter with proteinase k is a reliable method to extract microplastics from planktons samples (Cole et al. 2014), but at higher costs when considering large scale field sampling and monitoring.

Annex XI. Revised GPML Indicators and Targets
Indicators and targets - GPML implementation & related processes

Table 1. Generic Indicators – Goals A, B and C

Intended Outcome	**Indicator of GPML Implementation**	**Target (by December2016)**[2]	**Monitoring/Verification**
Operational partnership with a wide range of partners facilitated through an online forum promoting the Honolulu Commitment and Strategy	Number of Governments, organisations, agencies and institutions joining the GPML.	>100	Number of submitted forms to join the GPML
	An effective and functional international steering committee (SC)	SC established according to Terms of Reference and meeting at least once per year	SC meeting report, containing clear guidance to develop the GPML
	An effective and functional set of Regional Nodes	Four Regional Nodes established according to Terms of Reference with developed networks operational	Regional Nodes report to GPML Secretariat and Focal Areas A, B and C
	Meeting of the global partnership to review implementation of the Honolulu Strategy	Partnership meeting	Meeting report with recommendations for improving implementation of the GPML and associated management measures
Development of regional and national policy instruments aligned with the 'Honolulu Strategy'	Number of regional[3] and national policy instruments aligned with the Honolulu Strategy discussions for decision-making at respective levels.	5 regional policy instruments 10 national policy instruments	Policy instruments

[2]December 2016 is initial target date. Further targets to be agreed as the GPML develops.

[3]Regional in this context refers to multi-national bodies, agreements and other arrangements, such as Regional Seas Organisations. In some countries, regional is used to indicate sub-national levels of governance or organisation.

Table 2. Indicators and Targets - GPML Outputs

Intended outcome	Indicator of GPML outputs	Target (by December 2016)	Monitoring/verification
Operational partnership promoting the GPML Honolulu Strategy by the production of reports, articles, videos, training materials and related products and activities	Number of activities	1 per Region	Report uploaded to MLN
	Production of Steering Committee reports	1 per year from each	Reports approved by GPML Secretariat
	Production of GPML Newsletter/webinar	At least annual	Newsletter produced by GPML Secretariat
	Demonstration Project progress reports	1 annual progress report per project	Reports approved by GPML Secretariat

Table 3. Indicators and Targets - Demonstration Projects

Specific Land-Based Indicators based on Demonstration Projects – Goals A and C

Intended outcome	**Indicator description**	**Target (by 2020)**[4]	**Monitoring/verification**
Reduction of influx of solid waste to the marine environment through the demonstration of good policy and on-the-ground practices and technologies, including the introduction of new instruments and market-based policies	Reduction in the direct entry of plastic to the marine environment by improved waste management	20% reduction in marine input in 5 demonstration projects[5]	Self-reporting & project reports Independent assessment of degree of reduction of inputs and cost-benefit analysis.
	Increase in recycling rates of specified wastes	50% increase in recycling rates in 5 demonstration projects	Self-reporting & project reports Independent assessment of degree of increase of recycling
	Reduction in demand for ‘single-use’ plastic shopping bags[6]	25% reduction in demand in 5 countries	National reporting
	Agreement to adopt new good practises resulting from demonstration projects	10 Governments or private sector organisations agree to make use of good practises[7]	Self-reporting of proposed actions
	Number of illegal waste dumps on coast	Significant reduction[8]	National reporting

[4]Dependent on: i) the timescale for introduction of demonstration projects and other measures; ii) the scale and complexity of the socio-ecological system; iii) the willingness of all relevant stakeholders to play an active role; iv) the availability of technical know-how and funding as required; and, v) any in-built hysteresis in the social, economic, physical or ecological elements of the system (Oosterhuis et al. 2014).

[5]To include representative sectors, for example: illegal waste dumps, coastal tourism, waste management in urban areas, retail sector and Small Island Developing States (SIDS).

[6]For example, by introducing a charge per bag and encouraging more durable multiple-use replacements

[7]To include representative sectors, for example: illegal waste dumps, coastal tourism, waste management in urban areas, retail sector and SIDS.

[8]Significant reduction’ – this will be dependent on a number of factors including the chain of responsibility, context, identifying manageable sources and the cost-benefit of introducing reduction measures

Table 4. Specific Sea-based Indicators based on Demonstration Projects – Goals B and C

Intended Outcome	Indicator Description	Target (2020)[9]	Monitoring/Verification
Reduction of influx of solid waste to the marine environment through the demonstration of good policy and on-the- ground practices and technologies, including the introduction of new instruments and market-based policies	Reduction in the direct entry of plastic to the marine environment by improved waste management	20% reduction in marine input in 5 demonstration projects[10]	Self-reporting & project reports Independent assessment of degree of reduction of inputs and cost-benefit analysis.
	Increase in recycling rates of specified wastes	50% increase in recycling rates in 5 demonstration projects	Self-reporting & project reports Independent assessment of degree of increase of recycling
	Agreement to adopt new good practices resulting from demonstration projects	10 Governments or private sector organisations agree to make use of good practices[11]	Self-reporting of proposed actions

[9]Dependent on: i) the timescale for introduction of demonstration projects and other measures; ii) the scale and complexity of the socio-ecological system; iii) the willingness of all relevant stakeholders to play an active role; iv) the availability of technical know-how and funding as required; and v) any in-built hysteresis in the social, economic, physical or ecological elements of the system.

[10]To include representative sectors, for example: aquaculture, fisheries, shipping, cruise industry and recreational boating.

[11]To include representative sectors, for example: aquaculture, fisheries, shipping, cruise industry and recreational boating.

Table 5. Indicators and Potential Targets - Environmental State[12] - Goals A, B and C

Generic Indicators – Goal C

Intended outcome	**Indicator description**	**Target (2020-25)**	**Monitoring/verification**
Reduce the quantities and impact on the environment of marine litter entering from all sources	Number of cetaceans injured or killed	Significant reduction[13]	IWC, Regional Seas Bodies, national government, municipalities and NGO reporting
	Number of turtles killed by entanglement	Significant reduction	Regional Seas Bodies, national government, municipalities and NGO reporting
	Quantity of plastic (number and mass of items) in guts of indicator species from necropsies (e.g. fish, birds, reptiles, cetaceans)	Significant reduction	Regional Seas Bodies, national government, municipalities and NGO reporting
	Number and mass of items of floating macro-litter (items km^{-2})	Significant reduction	Regional Seas Bodies, national government and NGO reporting
	Number of items of floating micro-litter, especially microplastics (items km^{-2})	Significant reduction	Regional Seas Bodies, national government and NGO reporting
	Number and mass of items of litter on shorelines - km^{-1} shoreline		Regional Seas Bodies, national government and NGO reporting

Table 6. Specific Land-based Indicators – Goals A and C

Intended Outcome	**Indicator description**	**Target (2020-25)**	**Monitoring/verification**
Reduce the quantities and impact on the environment of marine litter introduced on land and entering the sea	Quantity of litter on tourist beaches - km^{-1} shoreline	Significant reduction[14]	Regional Seas Bodies, national government, municipalities and NGO reporting

[12]See JRC/EC 2013 for a comprehensive description of potential indicators of marine litter

[13] 'Significant reduction' – this will be dependent on a number of factors including the chain of responsibility, context, identifying manageable sources and the cost-benefit of introducing reduction measures

[14]'Significant reduction' – this will be dependent on a number of factors including the chain of responsibility, context, identifying manageable sources and the cost-benefit of introducing reduction measures

– Goals B and C

Intended Outcome	Indicator Description	Target (2020-25)	Monitoring/Verification
Reduce the quantities and impact on the environment of marine litter introduced directly at sea	Quantity (volume m^3 and length km) of capture fisheries gear abandoned, lost or otherwise discarded (ALDFG) (e.g. nets, lines, pots, FADs)	Significant reduction[15]	FAO reporting (LC/LP), Regional Seas Bodies, national governments, municipalities, fisheries industry
	Quantity of other capture fisheries-related items in the environment – items km^{-2} sea surface, km^{-2} water column, km^{-2} seabed, km^{-1} shoreline (e.g. strapping bands, boxes, rope)	Significant reduction	Reporting by NGOs, Regional Seas Bodies, national governments, municipalities, fisheries industry
	Quantity (volume m^3 and length km) of aquaculture gear abandoned, lost or otherwise discarded (ALDFG) - items km^{-2} sea surface, km^{-2} water column, km^{-2} seabed, km^{-1} shoreline (e.g. floats, rope, nets, cages, poles)	Significant reduction	FAO reporting; regional reporting e.g. Network of Aquaculture Centres in Asia-Pacific (NACA), NGOs, Regional Seas Bodies, national governments, municipalities
	Quantity of litter derived from commercial shipping	Significant reduction	National governments, NGOs, Regional Seas Bodies & municipalities reporting
	Quantity of litter derived from cruise industry	Significant reduction	National reporting
	Number of turtles killed by ALDFG	Significant reduction	CBD, Regional Seas Bodies, national and NGO reporting
	Number of cetaceans injured by ALDFG	Significant reduction	FAO, IWC, CBD, Regional Seas Bodies, national and NGO reporting
	Number of fish killed by ALDFG	Significant reduction	FAO, CBD, Regional Seas Bodies, national and NGO reporting
	Number of birds killed by ALDFG	Significant reduction	CBD, Regional Seas Bodies, national and NGO reporting
	Number of containers and other cargo lost by commercial shipping	Significant reduction	National and shipping industry reporting

[15]Significant reduction' – this will be dependent on a number of factors including the chain of responsibility, context, identifying manageable sources and the cost-benefit of introducing reduction measures

Indicators of Social and Economic Impacts - Goal C

Intended Outcome	**Indicator Description**	**Target (2020-25)**	**Monitoring/Verification**
Reduce the social and economic impact on the environment of marine litter entering from all sources	Number of vessels damaged or lost due to collisions or entanglement (e.g. fouled propellers or blocked cooling water intake)	Significant reduction[16]	Operators, national governments
	Loss of energy generation capacity (and income) and risk of accidental damage due to blocked cooling water intakes in coastal power stations, including nuclear power stations; loss of functioning of desalination plants.	Significant reduction	Operators, national governments
	Cost of beach cleaning	Significant reduction	Municipalities
	Number of injuries to public caused by marine litter	Significant reduction	National governments, municipalities, health authorities
	Number of call-outs of emergency services by stricken vessels	Significant reduction	National governments, emergency services, municipalities

[16] 'Significant reduction' – this will be dependent on a number of factors including the chain of responsibility, context, identifying manageable sources and the cost-benefit of introducing reduction measures

References

Alexander, K. A., P. Kershaw, P. Cooper, A. J. Gilbert, J. M. Hall-Spencer, J. J. Heymans, A. Kannen, H. J. Los, T. O'Higgins, C. O'Mahony, P. Tett, T. A. Troost and J. van Beusekom (2015). "Challenges of achieving Good Environmental Status in the Northeast Atlantic." Ecology and Society **20**(1)

Allen, R., D. Jarvis, S. Sayer and C. Mills (2012). "Entanglement of grey seals Halichoerus grypus at a haul out site in Cornwall, UK." Marine Pollution Bulletin **64**(12): 2815-2819

Andrady, A. L. and M. A. Neal (2009). "Applications and societal benefits of plastics." Philosophical Transactions of the Royal Society B: Biological Sciences **364(**1526): 1977-1984

Arcadis (2014). Marine Litter study to support the establishment of an initial quantitative headline reduction target - SFRA0025. European Commission DG Environment Project number BE0113.000668, URL: URL: http://ec.europa.eu/environment/marine/good-environmental-status/descriptor-10/pdf/final_report.pdf

Astudillo, J. C., M. Bravo, C. P. Dumont and M. Thiel (2009). "Detached aquaculture buoys in the SE Pacific: Potential dispersal vehicles for associated organisms." Aquatic Biology **5**(3): 219-231

Avery-Gomm, S., P. D. O'Hara, L. Kleine, V. Bowes, L. K. Wilson and K. L. Barry (2012). "Northern fulmars as biological monitors of trends of plastic pollution in the eastern North Pacific." Marine Pollution Bulletin **64**(9): 1776-1781

Avio, C. G., S. Gorbi, M. Milan, M. Benedetti, D. Fattorini, G. d'Errico, M. Pauletto, L. Bargelloni and F. Regoli (2015). "Pollutants bioavailability and toxicological risk from microplastics to marine mussels." Environmental Pollution **198**(0): 211-222

Baker-Austin, C., J. A. Trinanes, N. G. H. Taylor, R. Hartnell, A. Siitonen and J. Martinez-Urtaza (2013). "Emerging Vibrio risk at high latitudes in response to ocean warming." Nature Climate Change **3**(1): 73-77

Barnes, D. K. A. (2002). "Biodiversity: Invasions by marine life on plastic debris." Nature **416**(6883): 808-809

Barnes, D. K. A. and P. Milner (2005). "Drifting plastic and its consequences for sessile organism dispersal in the Atlantic Ocean." Marine Biology **146**(4): 815-825

Barnes, D. K. A., A. Walters and L. GonÃ§alves (2010). "Macroplastics at sea around Antarctica." Marine environmental research **70**(2): 250-252

Barreiros, J. P. and V. S. Raykov (2014). "Lethal lesions and amputation caused by plastic debris and fishing gear on the loggerhead turtle Caretta caretta (Linnaeus, 1758). Three case reports from Terceira Island, Azores (NE Atlantic)." Marine pollution bulletin **86**(1): 518-522

Baulch, S. and C. Perry (2014). "Evaluating the impacts of marine debris on cetaceans." Marine pollution bulletin **80**(1): 210-221

BiPRO (2013). Study of the largest loopholes within the flow of packaging material. Report prepared for DG Environment, European Commission, ENV.D.2/ETU/2011/0043, 97pp

Boerger, C. M., G. L. Lattin, S. L. Moore and C. J. Moore (2010). "Plastic ingestion by planktivorous fishes in the North Pacific Central Gyre." Marine Pollution Bulletin **60**(12): 2275-2278

Bond, A. L., J. F. Provencher, P.-Y. Daoust and Z. N. Lucas (2014). "Plastic ingestion by fulmars and shearwaters at Sable Island, Nova Scotia, Canada." Marine Pollution Bulletin **87**(1-2): 68-75

Bond, A. L., J. F. Provencher, R. D. Elliot, P. C. Ryan, S. Rowe, I. L. Jones, G. J. Robertson and S. I. Wilhelm (2013). "Ingestion of plastic marine debris by Common and Thick-billed Murres in the northwestern Atlantic from 1985 to 2012." Marine Pollution Bulletin **77**(1-2): 192-195

Bouwmeester, H., P. C. H. Hollman and R. J. B. Peters (2015). "Potential Health Impact of Environmentally Released Micro- and Nanoplastics in the Human Food Production Chain: Experiences from Nanotoxicology." Environmental Science & Technology **49**(15): 8932-8947

Box, G.E.P. (1976). Science and statistics. J *Journal of the American Statistical Association*, 71(356) pp. 791-799

Brida, J. G. and S. Zapata (2010). "Economic impacts of cruise tourism: the case of Costa Rica." Anatolia **21**(2): 322-338

Brown, S. B., B. A. Adams, D. G. Cyr and J. G. Eales (2004). "Contaminant effects on the teleost fish thyroid." Environmental Toxicology and Chemistry **23**(7): 1680-1701

Browne, M. (2015). Sources and Pathways of Microplastics to Habitats. Marine Anthropogenic Litter. M. Bergmann, L. Gutow and M. Klages, Springer International Publishing**:** 229-244

Browne, M. A., P. Crump, S. J. Niven, E. Teuten, A. Tonkin, T. Galloway and R. Thompson (2011). "Accumulation of Microplastic on Shorelines Woldwide: Sources and Sinks." Environmental Science & Technology **45**(21): 9175-9179

Browne, M. A., A. Dissanayake, T. S. Galloway, D. M. Lowe and R. C. Thompson (2008). "Ingested microscopic plastic translocates to the circulatory system of the mussel, Mytilus edulis (L.)." Environmental Science & Technology **42**(13): 5026-5031

Browne, M. A., T. Galloway and R. Thompson (2007). "Microplastic--an emerging contaminant of potential concern?" Integrated environmental assessment and management **3**(4): 559-561

Browne, M. A., T. S. Galloway and R. C. Thompson (2010). "Spatial Patterns of Plastic Debris along Estuarine Shorelines." Environmental Science & Technology **44**(9): 3404-3409

Browne, M. A., S. J. Niven, T. S. Galloway, S. J. Rowland and R. C. Thompson (2013). "Microplastic Moves Pollutants and Additives to Worms, Reducing Functions Linked to Health and Biodiversity." Current Biology **23**(23): 2388-2392

Buckley, P., J. Pinnegar, A. Dudek and A. Arquati (2011). "Report on European public awareness and perception of marine climate change risks and impacts." CLAMER: Climate Change and European Marine Ecosystem Research. Centre for Environment, Fisheries & Aquaculture Science (Cefas), Lowestoft, Suffolk.

Bürgi, E. (2015). Sustainable Development in International Law Making and Trade: International Food Governance and Trade in Agriculture, Edward Elgar Publishing.

Butt, N., Johnson, D., Pike, K., Pryce-Roberts, N. and Vigar, N. (2011). 15 years of shipping accidents; a review for WWF. Southampton Solent University, 56pp

Butterworth, A., Clegg, I., & Bass, C. (2012). Untangled – Marine debris: a global picture of the impact on animal welfare and of animal-focused solutions. London: World Society for the Protection of Animals, 78pp

Cadbury, D. (2003). Seven Wonders of the Industrial World. London and New York: Fourth Estate. pp. 165–6, 189–192

Calder, D. R., H. H. Choong, J. T. Carlton, J. W. Chapman, J. A. Miller and J. Geller (2014). "Hydroids (Cnidaria: Hydrozoa) from Japanese tsunami marine debris washing ashore in the northwestern United States." Aquatic Invasions **9**(4): 425-440

CalRecycle (2015) Beverage Container Recycling. Retrieved November 19, 2015 from http://www.calrecycle.ca.gov/bevcontainer/

Camedda, A., S. Marra, M. Matiddi, G. Massaro, S. Coppa, A. Perilli, A. Ruiu, P. Briguglio and G. A. de Lucia (2014). "Interaction between loggerhead sea turtles (Caretta caretta) and marine litter in Sardinia (Western Mediterranean Sea)." Marine Environmental Research **100**: 25-32

Campani, T., M. Baini, M. Giannetti, F. Cancelli, C. Mancusi, F. Serena, L. Marsili, S. Casini and M. C. Fossi (2013). "Presence of plastic debris in loggerhead turtle stranded along the Tuscany coasts of the Pelagos Sanctuary for Mediterranean Marine Mammals (Italy)." Marine Pollution Bulletin **74**(1): 225-230

Campbell, B. and D. Pauly (2013). "Mariculture: A global analysis of production trends since 1950." Marine Policy **39**: 94-100

Carpenter, E. J. and K. L. Smith Jr (1972). "Plastics on the Sargasso sea surface." Science **175**(4027): 1240-1241

Cartwright, S. R., R. A. Coleman and M. A. Browne (2006). "Ecologically relevant effects of pulse application of copper on the limpet Patella vulgata." Marine Ecology Progress Series **326**: 187-194

CCAMLR (2015) Report on the CCAMLR Marine Debris monitoring program (WG-FSA-15/15). CCAMLR Secretariat, Hobart.

Cheshire, A.C., Adler, E., Barbière, J., Cohen, Y., Evans, S., Jarayabhand, S., Jeftic, L., Jung, R.T., Kinsey, S., Kusui, E.T., Lavine, I., Manyara, P., Oosterbaan, L., Pereira, M.A., Sheavly, S., Tkalin, A., Varadarajan, S., Wenneker, B., Westphalen, G. (2009). UNEP/IOC Guidelines on Survey and Monitoring of Marine Litter. UNEP Regional Seas Reports and Studies, No. 186; IOC Technical Series No. 83: xii + 120 pp

Chavarro, J.M. (2013). Common concern of humankind and its implications in international environmental law. In (K de Feyter ed.) Globalisation and common responsibilities of states, Ashgate, pp. 337 – 351

Chin, C. B. (2008). Cruising in the Global Economy: Profits, Pleasure and work at Sea. Surrey, UK: Ashgate

Claessens, M., S. De Meester, L. Van Landuyt, K. De Clerck and C. R. Janssen (2011). "Occurrence and distribution of microplastics in marine sediments along the Belgian coast." Marine Pollution Bulletin **62**(10): 2199-2204

CleanSea (2015). Policy options for litter-free seas. An output of the project Towards a Clean Litter-free European Environment through Scientific Evidence, Innovative Tools and Good Governance, 2013-2015

CMS (2014) Management of marine debris. UNEP/CMS/Resolution 11.30. Convention on Migratory Species, 4pp

Cole, M., P. Lindeque, E. Fileman, C. Halsband and T. S. Galloway (2015). "The Impact of Polystyrene Microplastics on Feeding, Function and Fecundity in the Marine Copepod Calanus helgolandicus." Environmental Science & Technology **49**(2): 1130-1137

Cole, M., P. Lindeque, C. Halsband and T. S. Galloway (2011). "Microplastics as contaminants in the marine environment: A review." Marine Pollution Bulletin **62**(12): 2588-2597

Convery, F., S. McDonnell and S. Ferreira (2007). "The most popular tax in Europe? Lessons from the Irish plastic bags levy." Environmental & Resource Economics **38**(1): 1-11

Convey, P., D. K. A. Barnes and A. Morton (2002). "Debris accumulation on oceanic island shores of the Scotia Arc, Antarctica." Polar Biology **25**(8): 612-617

Corcoran, E., C. Nellemann, E. Baker, R. Bos, D. Osborn, H. Savelli (eds). 2010. Sick Water? The central role of waste- water management in sustainable development. A Rapid Response Assessment. United Nations Environment Programme, UN-HABITAT, GRID-Arendal. www.grida.no 88pp

Covello, V.T. and M.W. Merkhofer, M. W. (1993) Approaches for Assessing Health and Environmental Risks, Plenum Press, New York, USA

Cummings J (2005) Operational multivariate ocean data assimilation. Quart J Roy Meteor Soc Part C 131: 3583–3604

Dantas, D. V., M. Barletta and M. F. Da Costa (2012). "The seasonal and spatial patterns of ingestion of polyfilament nylon fragments by estuarine drums (Sciaenidae)." Environmental Science and Pollution Research **19**(2): 600-606

Davison, P. and R. G. Asch (2011). "Plastic ingestion by mesopelagic fishes in the North Pacific Subtropical Gyre." Marine Ecology Progress Series **432**: 173-180

Defra (2015). Review of standards for biodegradable plastic carrier bags. Department for Environment Food & Rural Affairs, UK, 38pp

DEPA (2015). Microplastics – occurrences, effects and sources of releases to the environment in Denmark. Danish Environmental Protection Agency, 205pp

Desforges, J.-P. W., M. Galbraith, N. Dangerfield and P. S. Ross (2014). "Widespread distribution of microplastics in subsurface seawater in the NE Pacific Ocean" Marine Pollution Bulletin **79**(1–2): 94-99

de Stephanis, R., J. Gimenez, E. Carpinelli, C. Gutierrez-Exposito and A. Canadas (2013). "As main meal for sperm whales: Plastics debris." Marine Pollution Bulletin **69**(1-2): 206-214

De Witte, B., L. Devriese, K. Bekaert, S. Hoffman, G. Vandermeersch, K. Cooreman and J. Robbens (2014). "Quality assessment of the blue mussel (Mytilus edulis): Comparison between commercial and wild types." Marine Pollution Bulletin **85**(1): 146-155

Deudero, S. and C. Alomar (2015). "Mediterranean marine biodiversity under threat: Reviewing influence of marine litter on species." Marine Pollution Bulletin **98**(1-2): 58-68

Devriese, L. I., M. D. van der Meulen, T. Maes, K. Bekaert, I. Paul-Pont, L. Frère, J. Robbens and A. D. Vethaak (2015). "Microplastic contamination in brown shrimp (Crangon crangon, Linnaeus 1758) from coastal waters of the Southern North Sea and Channel area." Marine pollution bulletin **98**(1): 179-187

Di Beneditto, A. P. M. and R. M. A. Ramos (2014). "Marine debris ingestion by coastal dolphins: What drives differences between sympatric species?" Marine pollution bulletin **83**(1): 298-301

Dris, R., H. Imhof, W. Sanchez, J. Gasperi, F. Galgani, B. Tassin and C. Laforsch (2015). "Beyond the ocean: contamination of freshwater ecosystems with (micro-)plastic particles." Environmental Chemistry **12**(5): 539-550

Duarte, C. M., K. A. Pitt, C. H. Lucas, J. E. Purcell, S.-i. Uye, K. Robinson, L. Brotz, M. B. Decker, K. R. Sutherland and A. Malej (2012). "Is global ocean sprawl a cause of jellyfish blooms?" Frontiers in Ecology and the Environment **11**(2): 91-97

Dumichen, E., A. K. Barthel, U. Braun, C. G. Bannick, K. Brand, M. Jekel and R. Senz (2015). "Analysis of polyethylene microplastics in environmental samples, using a thermal decomposition method." Water Res **85**: 451-457

Eastman, L., V. Hidalgo-Ruz, V. Macaya, P. Nuñez and M. Thiel (2014). "The potential for young citizen scientist projects: a case study of Chilean schoolchildren collecting data on marine litter." Revista de Gestão Costeira Integrada **14**(4): 569-579

Eastman, L. B., P. Nunez, B. Crettier and M. Thiel (2013). "Identification of self-reported user behavior, education level, and preferences to reduce littering on beaches - A survey from the SE Pacific." Ocean & Coastal Management **78**: 18-24

Ebbesmeyer, C. C., W. J. Ingraham, J. A. Jones and M. J. Donohue (2012). "Marine debris from the Oregon Dungeness crab fishery recovered in the Northwestern Hawaiian Islands: Identification and oceanic drift paths." Marine Pollution Bulletin **65**(1–3): 69-75

EC (2014) Towards a circular economy: a zero waste programme for Europe. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2014) 398 final, 14pp

EC (2015). Closing the loop – an EU action plan for the circular economy. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2015) 614/2, 21pp

EC (2015). Ex-Post evaluation of Directive 2000/59/EC on port reception facilities for ship-generated waste and cargo residues. Brussels: European Commission.

Ecorys (2011) The role of market-based instruments in achieving a resource efficient economy. Retrieved November 18, 2015 from http://ec.europa.eu/environment/enveco/taxation/pdf/role_marketbased.pdf

Ebbesmeyer and Sciano (2009). Flotsametrics and the Floating World: How One Man's Obsession with Runaway Sneakers and Rubber Ducks Revolutionized Ocean Science Smithsonian Books.

EEA (2001). "Late lessons from early warnings." EEA Report

EEA (2013). "Late lessons from early warnings." EEA Report 1/2013, 48pp

EMF (2014). Towards the circular economy. Volume 3: Accelerating the scale-up across global supply chains. Ellen McArthur Foundation, 80pp

EMSA. (2005). A Study on the Availability and Use of Port Reception Facilities for Ship-Generated Waste. Lisbon: European Maritime Safety Agency

Eriksen, M., A. Cummins, N. Maximenko, M. Thiel, G. Lattin, S. Wilson, J. Hafner, A. Zellers & S. Rifman (2013). "Plastic Pollution in the South Pacific Subtropical Gyre." Plastics Engineering **69**(5): 38+

Eriksen, M., L. C. M. Lebreton, H. S. Carson, M. Thiel, C. J. Moore, J. C. Borerro, F. Galgani, P. G. Ryan and J. Reisser (2014). "Plastic Pollution in the World's Oceans: More than 5 Trillion Plastic Pieces Weighing over 250,000 Tons Afloat at Sea." Plos One **9**(12)

Eriksen, M., N. Maximenko, M. Thiel, A. Cummins, G. Lattin, S. Wilson, J. Hafner, A. Zellers and S. Rifman (2013). "Plastic pollution in the South Pacific subtropical gyre." Marine Pollution Bulletin **68**(1-2): 71-76

Eriksson, C. and H. Burton (2003). "Origins and biological accumulation of small plastic particles in fur seals from Macquarie Island." Ambio **32**(6): 380-384

Essel, R., Engel, L. Carus, M. and Ahrens, R.H. (2015). Sources of microplastics relevant to marine protection in Germany. Umwelt Bundesamt, 64/2015, Report No. (UFA-FB) 002147/E, 46pp

Fanning, L., R. Mahon, P. McConney, J. Angulo, F. Burrows, B. Chakalall, D. Gil, M. Haughton, S. Heileman, S. Martinez, L. o. Ostine, A. Oviedo, S. Parsons, T. Phillips, C. S. Arroya, B. Simmons and C. Toro (2007). "A large marine ecosystem governance framework." Marine Policy **31**(4): 434-443

Fanshawe, T. and M. Everard (2002). "The impacts of marine litter." Marine Pollution Monitoring Management Group, Report of the Marine Litter Task Team (MaLiTT) May.

FAO **(**1993). *Recommendations for the marking of fishing gear supplement to the Expert Consultation on the Marking of Fishing Gear*. Victoria, British Columbia, Canada, 14–19 July 1991 (FAO). Fisheries Reports R485Suppl. Rome. 48 pp. ISBN 92-5-103330-7

FAO. 1995. Code of Conduct for Responsible Fisheries. Rome. 41 pp. ISBN 92-5-103834-1

FAO (2011). Global food losses and foodwaste – extent, causes and prevention. FAO, Rome.

FAO (2015) Global Aquaculture production statistics database updated to 2013; summary information, Fisheries and Aquaculture Department, FAO.

FAO (2014). The state of world fisheries and aquaculture 2014. Rome**:** 223pp

Farrell, P. and K. Nelson (2013). "Trophic level transfer of microplastic: Mytilus edulis (L.) to Carcinus maenas (L.)." Environmental Pollution **177**: 1-3

Feistel, R., S. Weinreben, H. Wolf, S. Seitz, P. Spitzer, B. Adel, G. Nausch, B. Schneider and D. G. Wright (2010). "Density and Absolute Salinity of the Baltic Sea 2006-2009." Ocean Science **6**(1): 3-24

Flint, S., T. Markle, S. Thompson and E. Wallace (2012). "Bisphenol A exposure, effects, and policy: A wildlife perspective." Journal of Environmental Management **104**: 19-34

Foekema, E. M., C. De Gruijter, M. T. Mergia, J. A. van Franeker, A. J. Murk and A. A. Koelmans (2013). "Plastic in North Sea Fish." Environmental Science & Technology **47**(15): 8818-8824

Fok, L. and P. K. Cheung (2015). "Hong Kong at the Pearl River Estuary: A hotspot of microplastic pollution." Marine Pollution Bulletin **99**(1-2): 112-118

Font, T. and J. Lloret (2014). "Biological and Ecological Impacts Derived from Recreational Fishing in Mediterranean Coastal Areas." Reviews in Fisheries Science & Aquaculture **22**(1): 73-85

Frey, O. and A. DeVogelaere (2014). "A Review of Resource Management Strategies for Protection of Seamounts." Silver Spring, MD:(1.8. Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries, 2014) **52**

Frost, A. and M. Cullen (1997). "Marine debris on northern New South Wales beaches (Australia): Sources and the role of beach usage." Marine Pollution Bulletin **34**(5): 348-352

Gabrielsen, K. M., G. D. Villanger, E. Lie, M. Karimi, C. Lydersen, K. M. Kovacs and B. M. Jenssen (2011). "Levels and patterns of hydroxylated polychlorinated biphenyls (OH-PCBs) and their associations with thyroid hormones in hooded seal (Cystophora cristata) mother-pup pairs." Aquatic Toxicology **105**(3-4): 482-491

Galgani, F., K. Ellerbrake, E. Fries and C. Goreux (2011). "Marine pollution: Let us not forget beach sand." Environmental Sciences Europe **23**(1): 40

Galgani, F., S. Jaunet, A. Campillo, X. Guenegen and E. His (1995). "DISTRIBUTION AND ABUNDANCE OF DEBRIS ON THE CONTINENTAL-SHELF OF THE NORTH-WESTERN MEDITERRANEAN-SEA." Marine Pollution Bulletin **30**(11): 713-717

Galgani, F., J. P. Leaute, P. Moguedet, A. Souplet, Y. Verin, A. Carpentier, H. Goraguer, D. Latrouite, B. Andral, Y. Cadiou, J. C. Mahe, J. C. Poulard and P. Nerisson (2000). "Litter on the sea floor along European coasts." Marine Pollution Bulletin **40**(6): 516-527

Galgani, F., A. Souplet and Y. Cadiou (1996). "Accumulation of debris on the deep sea floor off the FrenchMediterranean coast." Marine Ecology Progress Series **142**(1-3): 225-234

Galgani F., H. G., Werner S. and GES TG marine Litter, Ed. (2014). Guidance for monitoring marine litter in European seas.

Gambash, S., M. Kochba and Y. Avnimelech (1990). "STUDIES ON SLOW-RELEASE FERTILIZERS .2. A METHOD FOR EVALUATION OF NUTRIENT RELEASE RATE FROM SLOW-RELEASING FERTILIZERS." Soil Science **150**(1): 446-450

GESAMP (2008). Assessment and communication of environmental risks in coastal aquaculture (IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP Joint Group of Experts on Scientific Aspects of Marine Environmental Protection) Rome, FAO GESAMP Reports and Studies no. 76: 198pp

GESAMP (2015). Sources, fate and effects of microplastics in the marine environment: a global assessment." (Kershaw P.J ed.) (IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP/UNDP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection). Rep.Stud. GESAMP No.90, 96p

GESAMP (2016) Sources, fate and effects of microplastics in the marine environment: second phase assessment part one" (Kershaw P.J. and Rochman, C. eds.) (IMO/FAO/UNESCO IOC/UNIDO/WMO/ IAEA/UN/UNEP/UNDP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection). Rep.Stud. GESAMP

Gilardi, K. V. K., D. Carlson-Bremer, J. A. June, K. Antonelis, G. Broadhurst and T. Cowan (2010). "Marine species mortality in derelict fishing nets in Puget Sound, WA and the cost/benefits of derelict net removal." Marine Pollution Bulletin **60**(3): 376-382

Gilman, E. (2015). "Status of international monitoring and management of abandoned, lost and discarded fishing gear and ghost fishing." Marine Policy **60**: 225-239

Gilman, E., Chopin, F., Suuronen, P. & Kuemlangan, B. (in press). Abandoned, lost and discarded gill nets and trammel nets - Methods to estimate ghost fishing mortality, and status of regional monitoring and management. *FAO Fisheries and Aquaculture Technical Paper Nr 600*.

Gitti, G., Schweitzer, J-P., Watkins, W., Russi, D., Konar Mutafoglu, K. and ten Brink, P. (2015). Marine litter: Market Based Instruments to face the market failure. Institute of European Environmental Policy, Brussels.

Gjøsaeter, J. and K. Kawaguchi (1980). A review of the world resources of mesopelagic fish, Food & Agriculture Org.

Goldstein, M. C., H. S. Carson and M. Eriksen (2014). "Relationship of diversity and habitat area in North Pacific plastic-associated rafting communities." Marine Biology **161**(6): 1441-1453

Goldstein, M. C., M. Rosenberg and L. Cheng (2012). "Increased oceanic microplastic debris enhances oviposition in an endemic pelagic insect." Biology Letters **8**(5): 817-820

Graham, E. R. and J. T. Thompson (2009). "Deposit- and suspension-feeding sea cucumbers (Echinodermata) ingest plastic fragments." Journal of Experimental Marine Biology and Ecology **368**(1): 22-29

Gregory, M. R. (2009). "Environmental implications of plastic debris in marine settings- entanglement, ingestion, smothering, hangers-on, hitch-hiking and alien invasions." Philosophical Transactions of the Royal Society B: Biological Sciences **364**(1526): 2013-2025

Hall-Spencer, J. M., M. Tasker, M. Soffker, S. Christiansen, S. Rogers, M. Campbell and K. Hoydal (2009). "Design of Marine Protected Areas on high seas and territorial waters of Rockall Bank." Marine Ecology Progress Series **397**: 305-308

Hammer, S., R. G. Nager, P. C. D. Johnson, R. W. Furness and J. F. Provencher (2016). "Plastic debris in great skua (Stercorarius skua) pellets corresponds to seabird prey species." Marine Pollution Bulletin **103**(1–2): 206-210

Hardesty, B. D., D. Holdsworth, A. T. Revill and C. Wilcox (2015). "A biochemical approach for identifying plastics exposure in live wildlife." Methods in Ecology and Evolution **6**(1): 92-98

Hidalgo-Ruz, V., L. Gutow, R. C. Thompson and M. Thiel (2012). "Microplastics in the marine environment: a review of the methods used for identification and quantification." Environ Sci Technol **46**(6): 3060-3075

Hidalgo-Ruz, V. and M. Thiel (2013). "Distribution and abundance of small plastic debris on beaches in the SE Pacific (Chile): A study supported by a citizen science project." Marine Environmental Research **87-88**: 12-18

Hinojosa, I. A. and M. Thiel (2009). "Floating marine debris in fjords, gulfs and channels of southern Chile." Marine Pollution Bulletin **58**(3): 341-350

Hoarau, L., L. Ainley, C. Jean and S. Ciccione (2014). "Ingestion and defecation of marine debris by loggerhead sea turtles, Caretta caretta, from by-catches in the South-West Indian Ocean." Marine Pollution Bulletin **84**(1-2): 90-96

Hohn, J (2011). "Moby Duck: The True Story of 28,800 Bath Toys Lost at Sea and of the Beachcombers, Oceanographers, Environmentalists, and Fools, Including the Author, Who Went in Search of Them." Penguin.

Hong, S., J. Lee, Y. C. Jang, Y. J. Kim, H. J. Kim, D. Han, S. H. Hong, D. Kang and W. J. Shim (2013). "Impacts of marine debris on wild animals in the coastal area of Korea." Marine Pollution Bulletin **66**(1-2): 117-124

Hong, S., J. Lee, D. Kang, H.-W. Choi and S.-H. Ko (2014). "Quantities, composition, and sources of beach debris in Korea from the results of nationwide monitoring." Marine pollution bulletin **84**(1-2): 27-34

Hoornweg, D. and Bhada-Tata, P. (2012). What a waste: a global review of solid waste management. Urban Development Series No. 15, World Bank, Washington, USA, 116pp

Hubinger, J. C. and D. C. Havery (2006). "Analysis of consumer cosmetic products for phthalate esters." J Cosmet Sci **57**(2): 127-137

Irigoien, X., T. A. Klevjer, A. Røstad, U. Martinez, G. Boyra, J. Acuña, A. Bode, F. Echevarria, J. Gonzalez-Gordillo and S. Hernandez-Leon (2014). "Large mesopelagic fishes biomass and trophic efficiency in the open ocean." Nature communications **5**.

Ivar do Sul, J. A. and M. F. Costa (2014). "The present and future of microplastic pollution in the marine environment." Environmental Pollution **185**(0): 352-364

Ivar do Sul, J. A., M. F. Costa, J. S. Silva-Cavalcanti and M. C. B. Araújo (2014). "Plastic debris retention and exportation by a mangrove forest patch." Marine Pollution Bulletin **78**(1–2): 252-257

IWC (2014). Report on the IWC workshop on mitigation and management of the threats posed by marine debris for cetaceans. Conservation Committee, International Whaling Commission, IWC/65/CCRep04 (CC Agenda Item 9), 40pp

Jambeck, J. R., R. Geyer, C. Wilcox, T. R. Siegler, M. Perryman, A. Andrady, R. Narayan and K. L. Law (2015). "Plastic waste inputs from land into the ocean." Science **347**(6223): 768-771

Jantz, L. A., C. L. Morishige, G. L. Bruland and C. A. Lepczyk (2013). "Ingestion of plastic marine debris by longnose lancetfish (Alepisaurus ferox) in the North Pacific Ocean." Marine Pollution Bulletin **69**(1-2): 97-104

Jepson et al. 2016, PCB pollution continues to impact populations of orcas and other dolphins in European waters. Sci. Rep.6, 18573

Johnston, E. L. and D. A. Roberts (2009). "Contaminants reduce the richness and evenness of marine communities: A review and meta-analysis." Environmental Pollution **157**(6): 1745-1752

JRC (2011). Marine litter: technical recommendations for the implementation of MSFD requirements. Joint Research Centre of the European Commission, Ispra. EUR 25009 EN-2011, 93pp

JRC (2013). Guidance on monitoring of marine litter in European Seas. Joint Research Centre of the European Commission, Ispra, EUR 26113 EN, 128pp

Kaluza, P., A. Kölzsch, M. T. Gastner and B. Blasius (2010). "The complex network of global cargo ship movements." Journal of The Royal Society Interface.

Kaposi, K. L., B. Mos, B. P. Kelaher and S. A. Dworjanyn (2014). "Ingestion of Microplastic Has Limited Impact on a Marine Larva." Environmental Science & Technology **48**(3): 1638-1645

Karcher, M. J., S. Gerland, I. H. Harms, M. Iosjpe, H. E. Heldal, P. J. Kershaw and M. Sickel (2004). "The dispersion of Tc-99 in the Nordic Seas and the Arctic Ocean: a comparison of model results observations." Journal of Environmental Radioactivity **74**(1-3): 185-198

Karlsson, T. (2015). Can microliter in sediment and biota be quantified? Method development and analysis of microliter in field collected biota and sediment. Master thesis, University of Gothenburg and VU University of Amsterdam-IVM.

Klein, R. A. (2002). Cruise Ship Blues: The Underside of the Cruise Industry. Gabriola Island, BC: New Society.

Kohler, M., J. Tremp, M. Zennegg, C. Seiler, S. Minder-Kohler, M. Beck, P. Lienemann, L. Wegmann and P. Schmidt (2005). "Joint sealants: An overlooked diffuse source of polychlorinated biphenyls in buildings." Environmental Science & Technology **39**(7): 1967-1973

Kripa, V., K. Mohamed, D. Prema, A. Mohan and K. Abhilash (2014). "Persistent occurrence of potential fishing zones in the southeastern Arabian Sea." Indian Journal of Geo-Marine Sciences **43**(5): 737-745

Kuhn, S. and J. A. van Franeker (2012). "Plastic ingestion by the northern fulmar (Fulmarus glacialis) in Iceland." Marine Pollution Bulletin **64**(6): 1252-1254

Kühn, S. and J. A. van Franeker (2012). "Plastic ingestion by the northern fulmar (Fulmarus glacialis) in Iceland." Marine pollution bulletin **64**(6): 1252-1254

Kukulka, T., G. Proskurowski, S. Moret-Ferguson, D. W. Meyer and K. L. Law (2012). "The effect of wind mixing on the vertical distribution of buoyant plastic debris." Geophysical Research Letters **39**.

Laist, D. W. (1997). Impacts of marine debris: entanglement of marine life in marine debris including a comprehensive list of species with entanglement and ingestion records. Marine Debris, Springer**:** 99-139

Lattin, G. L., C. J. Moore, A. F. Zellers, S. L. Moore and S. B. Weisberg (2004). "A comparison of neustonic plastic and zooplankton at different depths near the southern California shore." Marine Pollution Bulletin **49**(4): 291-294

Lavee, D. (2010). "A cost-benefit analysis of a deposit-refund program for beverage containers in Israel." Waste Management **30**(2): 338-345

Law, K. L., S. Moret-Ferguson, N. A. Maximenko, G. Proskurowski, E. E. Peacock, J. Hafner and C. M. Reddy (2010). "Plastic Accumulation in the North Atlantic Subtropical Gyre." Science **329**(5996): 1185-1188

Law, K. L., S. E. Morét-Ferguson, D. S. Goodwin, E. R. Zettler, E. DeForce, T. Kukulka and G. Proskurowski (2014). "Distribution of Surface Plastic Debris in the Eastern Pacific Ocean from an 11-Year Data Set." Environmental Science & Technology **48**(9): 4732-4738

Law, R. J., J. Barry, J. L. Barber, P. Bersuder, R. Deaville, R. J. Reid, A. Brownlow, R. Penrose, J. Barnett, J. Loveridge, B. Smith and P. D. Jepson (2012). "Contaminants in cetaceans from UK waters: Status as assessed within the Cetacean Strandings Investigation Programme from 1990 to 2008." Marine Pollution Bulletin **64**(7): 1485-1494

Lazar, B. and R. Gracan (2011). "Ingestion of marine debris by loggerhead sea turtles, Caretta caretta, in the Adriatic Sea." Marine Pollution Bulletin **62**(1): 43-47

Lebreton, L. C., S. D. Greer and J. C. Borrero (2012). "Numerical modelling of floating debris in the world's oceans." Mar Pollut Bull **64**(3): 653-661

Lechner, A., H. Keckeis, F. Lumesberger-Loisl, B. Zens, R. Krusch, M. Tritthart, M. Glas and E. Schludermann (2014). "The Danube so colourful: A potpourri of plastic litter outnumbers fish larvae in Europe's second largest river." Environmental Pollution **188**: 177-181

Lee, J., S. Hong, Y. C. Jang, M. J. Lee, D. Kang and W. J. Shim (2015). "Finding solutions for the styrofoam buoy debris problem through participatory workshops." Marine Policy **51**: 182-189

Lee, J., S. Hong, Y. K. Song, S. H. Hong, Y. C. Jang, M. Jang, N. W. Heo, G. M. Han, M. J. Lee, D. Kang and W. J. Shim (2013). "Relationships among the abundances of plastic debris in different size classes on beaches in South Korea." Marine Pollution Bulletin **77**(1-2): 349-354

Lee, S., Y.-C. Jang, J.-G. Kim, J.-E. Park, Y.-Y. Kang, W.-I. Kim and S.-K. Shin (2015). "Static and dynamic flow analysis of PSDEs in plastics from used arid end-of-life TVs and computer monitors by life cycle in Korea." Science of the Total Environment **506**: 76-85

Leslie, H.A., van Velzen, M.J.M. and Vethaak, A.D. (2013). Microplastic survey of the Dutch environment: novel data set of microplastics in North Sea sediments, treated wastewater effluents and marine biota. IVM, Vrei Universtat, Amsterdam.

Letessier, T. B., P. J. Bouchet, J. Reisser and J. J. Meeuwig (2015). "Baited videography reveals remote foraging and migration behaviour of sea turtles." Marine Biodiversity **45**(4): 609-610

Li, J., D. Yang, L. Li, K. Jabeen and H. Shi (2015). "Microplastics in commercial bivalves from China." Environmental pollution (Barking, Essex : 1987) **207**: 190-195

Liebezeit, G. and E. Liebezeit (2013). "Non-pollen particulates in honey and sugar." Food Additives & Contaminants: Part A **30**(12): 2136-2140

Liebezeit, G. and E. Liebezeit (2014). "Synthetic particles as contaminants in German beers." Food Additives and Contaminants Part a-Chemistry Analysis Control Exposure & Risk Assessment **31**(9): 1574-1578

Lippiatt, S., Opfer, S., and Arthur, C. 2013. Marine Debris Monitoring and Assessment. NOAA Technical Memorandum NOS-OR&R-46

Lithner, D., A. Larsson and G. Dave (2011). "Environmental and health hazard ranking and assessment of plastic polymers based on chemical composition." Science of the Total Environment **409**(18): 3309-3324

Lloret, J., A. Garrote, N. Balasch and T. Font (2014). "Estimating recreational fishing tackle loss in Mediterranean coastal areas: Potential impacts on wildlife." Aquatic Ecosystem Health & Management **17**(2): 179-185

Loizidou, X. I., M. I. Loizides and D. L. Orthodoxou (2014). "A novel best practices approach: The MARLISCO case." Marine Pollution Bulletin **88**(1-2): 118-128

Lozier, M. S. (2015). "Overturning Assumptions: Past, present, and future concerns about the ocean's circulation." Oceanography **28**(2): 240-251

Lusher, A. L., M. McHugh and R. C. Thompson (2013). "Occurrence of microplastics in the gastrointestinal tract of pelagic and demersal fish from the English Channel." Marine Pollution Bulletin **67**(1-2): 94-99

Lusher, A. L., V. Tirelli, I. O'Connor and R. Officer (2015). "Microplastics in Arctic polar waters: the first reported values of particles in surface and sub-surface samples." Scientific Reports **5**: 14947

Mace, T. H. (2012). "At-sea detection of marine debris: Overview of technologies, processes, issues, and options." Marine Pollution Bulletin **65**(1–3): 23-27

Macfadyen, G., T. Huntington and R. Cappell (2009). Abandoned, lost or otherwise discarded fishing gear, Food and Agriculture Organization of the United Nations (FAO).

Mallory, M. L. (2008). "Marine plastic debris in northern fulmars from the Canadian high Arctic." Marine Pollution Bulletin **56**(8): 1501-1504

Mallory, M. L., G. J. Roberston and A. Moenting (2006). "Marine plastic debris in northern fulmars from Davis Strait, Nunavut, Canada." Marine Pollution Bulletin **52**(7): 813-815

Masó, M., E. Garcés, F. Pagès and J. Camp (2003). "Drifting plastic debris as a potential vector for dispersing Harmful Algal Bloom (HAB) species." Scientia Marina **67**(1): 107-111

Masura, J., J. Baker1, G. Foster,C. Arthur, C. Herring (2015). Laboratory methods for the analysis of microplastics in the marine environment: recommendations for quantifying synthetic particles in waters and sediments. . NOAA Technical Memorandum 20.

Mathalon, A. and P. Hill (2014). "Microplastic fibers in the intertidal ecosystem surrounding Halifax Harbor, Nova Scotia." Marine Pollution Bulletin **81**(1): 69-79

Maxim, L.; J. H. Spangenberg; M. O'Connor (2009) An analysis of risk for biodiversity under the DPSIR framework. Ecological Economics, 69.12-23. doi:10.1016/j.ecolecon.2009.03.017

Maximenko, A., E. Olevsky and M. Shtern (2008). "Plastic behavior of agglomerated powder." Computational Materials Science **43**(4): 704-709

Maximenko, N., J. Hafner and P. Niiler (2012). "Pathways of marine debris derived from trajectories of Lagrangian drifters." Marine Pollution Bulletin **65**(1): 51-62.

McDermid, K. J. and T. L. McMullen (2004). "Quantitative analysis of small-plastic debris on beaches in the Hawaiian archipelago." Marine Pollution Bulletin **48**(7-8): 790-794.

McDonough, W., M. Braungart and B. Clinton (2013). The upcycle: Beyond sustainability--designing for abundance, Macmillan.

McElwee, K., M. J. Donohue, C. A. Courtney, C. Morishige and A. Rivera-Vicente (2012). "A strategy for detecting derelict fishing gear at sea." Marine Pollution Bulletin **65**(1–3): 7-15

McElwee, K., Morishige, C. (Eds.) (2010). In: Proceedings of the Workshop on At-sea Detection and Removal of Derelict Fishing Gear. December 9–10, 2008. US Dept. of Commerce, National Oceanic and Atmospheric Administration Technical Memorandum NOS- OR&R-34

McIlgorm, A., Campbell H. F. and Rule M. J. (2011), ‘The economic cost and control of marine debris damage in the Asia-Pacific region’, Ocean & Coastal Management 54 (2011) 643-651

Mee, L. (2006). "Reviving dead zones." Scientific American **295**(5): 78-85

MCS (2014). Great British bean-clean, 2014 report. Marine Conservation Society, 8pp

Mee, L., P. Cooper, A. Kannen, A. J. Gilbert and T. O'Higgins (2015). "Sustaining Europe's seas as coupled social-ecological systems." Ecology and Society **20**(1)

Mee, L. D., R. L. Jefferson, D. d. A. Laffoley and M. Elliott (2008). "How good is good? Human values and Europe's proposed Marine Strategy Directive." Marine Pollution Bulletin **56**(2): 187-204

Mercer, I. (2007). MSC Napoli; the aftermath of the beaching off Branscombe, East Deven, 20 January 2007. Report of an Inquiry. Devon County Council, 44pp

Mintenig, S., Int-Ven, I., Löder, M and Gerdts, G. (2014). Mikropalstik un ausgewählten Kläranlagen des Oldenburgisch- Ostfriesischen Wasservrbandes (OOWV) in Niederasachsen. Alfred Wegener Institute, Helgoland, 50 pp. Moore, M., Bogomolni, A., Bowman, R., Hamilton, P., Harry, C., Knowlton, A., Landry, S., Rotstein, D.S. and Touhey, K. (2006). Fatally entangled right whales can die extremely slowly. Oceans 06, MTS-IEEE-Boston, Massachusetts, September 18-21, 2006. p3.

Morishige, C. and K. McElwee (2012). "At-sea detection of derelict fishing gear in the North Pacific: An overview." Marine Pollution Bulletin **65**(1-3): 1-6

Morritt, D., P. V. Stefanoudis, D. Pearce, O. A. Crimmen and P. F. Clark (2014). "Plastic in the Thames: A river runs through it." Marine Pollution Bulletin **78**(1–2): 196-200

Mouat, J. and R. L. Lozano "Of Marine Litter."

Murphy S, Barber JL, Learmonth JA, Read FL, Deaville R, Perkins MW, et al. (2015) Reproductive Failure in UK Harbour Porpoises *Phocoena phocoena*: Legacy of Pollutant Exposure? PLoS ONE 10(7): e0131085. doi:10.1371/journal. pone.0131085

Murray, F. and P. R. Cowie (2011). "Plastic contamination in the decapod crustacean Nephrops norvegicus (Linnaeus, 1758)." Marine Pollution Bulletin **62**(6): 1207-1217

Muthu, S. S., Y. Li, J.-Y. Hu and P.-Y. Mok (2012). "Recyclability Potential Index (RPI): The concept and quantification of RPI for textile fibres." Ecological Indicators **18**(0): 58-62

Muthu, S. S., Y. Li, J. Y. Hu and P. Y. Mok (2012). "A hot-button societal issue: Biodegradation studies (soil burial test) of grocery shopping bags." Energy Education Science and Technology Part a-Energy Science and Research **29**(1): 31-40

Muthu, S. S., Y. Li, J. Y. Hu and P. Y. Mok (2012). "Quantification of environmental impact and ecological sustainability for textile fibres." Ecological Indicators **13**(1): 66-74

Napper, I. E., A. Bakir, S. J. Rowland and R. C. Thompson (2015). "Characterisation, quantity and sorptive properties of microplastics extracted from cosmetics." Marine Pollution Bulletin **99**(1-2): 178-185

NEA (2014). Sources of microplastics to the marine environment, Norwegian Environment Agency (Miljødirektoratet).

Neves, A. A. S., N. Pinardi, F. Martins, J. Janeiro, A. Samaras, G. Zodiatis and M. De Dominicis (2015). "Towards a common oil spill risk assessment framework - Adapting ISO 31000 and addressing uncertainties." Journal of Environmental Management **159**: 158-168

Nevins, H., Donnelly, E., Hester, M., Hyrenbach, D., 2011. Evidence for increasing plastic ingestion in northern fulmars (Fulmarus glacialis rodgersii) in the Pacific. In: Fifth International Marine Debris Conference, Honolulu Hawaii 20e25 Mar 2011. Oral Presentation Extended Abstracts 4.b.3, pp 140-144

Newman, S., Watkins, E., Farmer, A., ten Brink, P., & Schweitzer, J.-P. (2015). The Economics of Marine Litter. In M. Bergmann, L. Gutow, & M. Klages, Marine Anthropogenic Litter (pp. 367-394). London: Springer Open.

Niemeijer, D. and R. S. de Groot (2008). "A conceptual framework for selecting environmental indicator sets." Ecological Indicators **8**(1): 14-25

NOAA (2014). Report on the Entanglement of Marine Species in Marine Debris with an Emphasis on Species in the United States. National Oceanic and Atmospheric Administration Marine Debris Program Silver Spring, MD. 28pp

NOAA (2015). Report on the impacts of “ghost fishing” via derelict fishing gear. NOAA Marine Debris Program Silver Spring, MD. 25pp

NOWPAP (2007). Guidelines for monitoring litter on the beaches and shorelines of the Northwest Pacific Region. NOWPAP CEARAC, 12pp

NOWPAP (2011). Marine Litter Guidelines for Tourists and Tour Operators in Marine and Coastal Areas, NOWPAP CEARAC, 11pp

North, E. J. and R. U. Halden (2013). "Plastics and Environmental Health: The Road Ahead." Reviews on environmental health **28**(1): 1-8

Nuñez, P., Thiel, M. (2011). El Viaje de Jurella y los Microplásticos. Científicos de la Basura, Coquimbo. http://www.cientificosdelabasura.cl/docs/jurella.pdf

NPA (2015). Harbour Dues and Environmental Protection Levy. Retrieved September 10, 2015, from Nigerian Port Authority: http://www.nigerianports.org/dynamicdata/uploads/Tariffs/TARIFFShipApr15.pdf?id=96

Obi, I. (2009). African Circle invests $43m to reduce ship pollution in Lagos. Retrieved November 20, 2015, from Vanguard: http://www.vanguardngr.com/2009/08/african-circle-invests-43m-to-reduce-ship-pollution-in-lagos/

Ocean Conservancy (2014). Report of the International Coastal Clean-up 2013.

Ocean Conservancy 2015). Stemming the tide: land-based strategies for a plastic-free ocean. Ocean Conservancy and McKinsey Center for Business and Environment, 48pp

OECD (2001). Extended producer responsibility – a guidance manual for governments. Organisation for Economic Cooperation and Development, Paris, 164 pp

OECD (2005). Analytical Framework for Evaluating the Costs and Benefits of Extended Producer Responsibility Programmes. Organisation for Economic Cooperation and Development, Paris.

OECD (2011) Environmental Taxation – A guide for policy makers. Organisation for Economic Cooperation and Development, Paris, Retrieved November 20, 2015 from http://www.oecd.org/env/tools-evaluation/48164926.pdf

OECD (2012). "Detailed review paper on the state of the science on novel in vitro and in vivo screening and testing methods and endpoints for evaluating endocrine disruptors." OECD Series on Testing and Assessment no. 178, 213pp

OECD and Japanese Ministry of the Environment (2014) Issues Paper: The State of Play on Extended Producer Responsibility (EPR): Opportunities and Challenges: http://www.oecd.org/environment/waste/Global%20Forum%20Tokyo%20Issues%20Paper%2030-5-2014.pdf

Oehlmann, J., U. Schulte-Oehlmann, W. Kloas, O. Jagnytsch, I. Lutz, K. O. Kusk, L. Wollenberger, E. M. Santos, G. C. Paull, K. J. W. Van Look and C. R. Tyler (2009). "A critical analysis of the biological impacts of plasticizers on wildlife." Philosophical Transactions of the Royal Society B-Biological Sciences **364**(1526): 2047-2062

Oehlmann, J., U. Schulte-Oehlmann, W. Kloas, O. Jagnytsch, I. Lutz, K. O. Kusk, L. Wollenberger, E. M. Santos, G. C. Paull, K. J. W. VanLook and C. R. Tyler (2009). "A critical analysis of the biological impacts of plasticizers on wildlife." Philosophical Transactions of the Royal Society B: Biological Sciences **364**(1526): 2047-2062

Oosterhuis, F., E. Papyrakis and B. Boteler (2014). "Economic instruments and marine litter control." Ocean & Coastal Management **102**: 47-54

ORA 2015. 2015 plastics-to-fuel project developer's guide. Prepared by the Ocean Recovery Alliance for the American Chemistry Council, 74pp

OSPAR (2007). Monitoring of marine litter in the OSAPR region. OSPAR Pilot Project on monitoring marine beach litter. OSPAR, London, 75pp

Pape, J., Rau, H., Fahy, F. and Davies, A. (2011) Developing Policies and Instruments for Sustainable Household Consumption: Irish Experiences and Futures. J Consum Policy, Vol: 34, pp. 25–42 DOI 10.1007/s10603-010-9151-4

Pease, C. J., E. L. Johnston and A. G. B. Poore (2010). "Genetic variability in tolerance to copper contamination in a herbivorous marine invertebrate." Aquatic Toxicology **99**(1): 10-16

Pemba, A. G., M. Rostagno, T. A. Lee and S. A. Miller (2014). "Cyclic and spirocyclic polyacetal ethers from lignin-based aromatics." Polymer Chemistry **5**(9): 3214-3221

Peterlin, M., B. Kontic and B. C. Kross (2005). "Public perception of environmental pressures within the Slovene coastal zone." Ocean & Coastal Management **48**(2): 189-204

Pham, C. K., E. Ramirez-Llodra, C. H. S. Alt, T. Amaro, M. Bergmann, M. Canals, J. B. Company, J. Davies, G. Duineveld, F. Galgani, K. L. Howell, V. A. I. Huvenne, E. Isidro, D. O. B. Jones, G. Lastras, T. Morato, J. N. Gomes-Pereira, A. Purser, H. Stewart, I. Tojeira, X. Tubau, D. Van Rooij and P. A. Tyler (2014). "Marine Litter Distribution and Density in European Seas, from the Shelves to Deep Basins." PLoS ONE **9**(4): e95839

Pidgeon, N. and T. Rogers-Hayden (2007). "Opening up nanotechnology dialogue with the publics: risk communication or 'upstream engagement'?" Health, Risk & Society **9**(2): 191-210

PlasticsEurope (2013). Plastics - the Facts 2013. An analysis of European latest plastics production, demand and waste data. Brussels, Plastics Europe: Association of Plastic Manufacturers: 40

Plastics Europe (2014) Plastics the facts 2013

Plastics Europe (2015) Plastics the facts 2014

Port of Gdansk Authority SA. (2012). Fee tariff for services of Port of Gdansk Authority SA. Retrieved November 20, 2015, from http://www.portgdansk.pl/events/780/pga-sa-tariff-2012.pdf

Potemra, J. T. (2012). "Numerical modeling with application to tracking marine debris." Marine Pollution Bulletin **65**(1–3): 42-50

Provencher, J. F., A. J. Gaston, M. L. Mallory, D. O'Hara P and H. G. Gilchrist (2010). "Ingested plastic in a diving seabird, the thick-billed murre (Uria lomvia), in the eastern Canadian Arctic." Mar Pollut Bull **60**(9): 1406-1411

Rainbow, P. S. (2007). "Trace metal bioaccumulation: models, metabolic availability and toxicity." Environment international **33**(4): 576-582

Rech, S. &V. Macaya-Caquilpán & J. F. Pantoja & M. M. Rivadeneira & C. Kroeger Campodónico & M. Thiel. Sampling of riverine litter with citizen scientists—findings and recommendations. Environ Monit Assess (2015) 187:335 DOI 10.1007/s10661-015-4473-y

Recuerda Girela, M. A. (2006) Risk and reason in the European Union Law. European Food and Feed Law Review, 270

Reddy, M. S., B. Shaik, S. Adimurthy and G. Ramachandraiah (2006). "Description of the small plastics fragments in marine sediments along the Alang-Sosiya ship-breaking yard, India." Estuarine, Coastal and Shelf Science **68**(3-4): 656-660

Reich, M. C. (2005). "Economic assessment of municipal waste management systems - case studies using a combination of life cycle assessment (LCA) and life cycle costing (LCC)." Journal of Cleaner Production **13**(3): 253-263

Reisser, J., J. Shaw, G. Hallegraeff, M. Proietti, D. K. A. Barnes, M. Thums, C. Wilcox, B. D. Hardesty and C. Pattiaratchi (2014). "Millimeter-Sized Marine Plastics: A New Pelagic Habitat for Microorganisms and Invertebrates." Plos One **9**(6)

Reisser, J., J. Shaw, C. Wilcox, B. D. Hardesty, M. Proietti, M. Thums and C. Pattiaratchi (2013). "Marine Plastic Pollution in Waters around Australia: Characteristics, Concentrations, and Pathways." Plos One **8**(11)

Reisser, J., B. Slat, K. Noble, K. du Plessis, M. Epp, M. Proietti, J. de Sonneville, T. Becker and C. Pattiaratchi (2015). "The vertical distribution of buoyant plastics at sea: an observational study in the North Atlantic Gyre." Biogeosciences **12**(4): 1249-1256

Robbins, J., Barlow, J., Burdin, A.M., Calambokidis, J., Gabriele, C., Clapham, P., Ford, J., LeDuc, R., Mattila, D.K., Quinn, T., Rojas-Bracho, L., Straley, J., Urban, J., Wade, P., Weller, D., Witteveen, B.H., Wynne, K. and Yamaguchi, M. 2007. Comparison of humpback whale entanglement across the North Pacific Ocean based on scar evidence. Unpublished report to the Scientific Committee of the International Whaling Commission. Report number SC/59/BCRoberts, D. A., E. L. Johnston and A. G. B. Poore (2008). "Contamination of marine biogenic habitats and effects upon associated epifauna." Marine Pollution Bulletin **56**(6): 1057-1065

Rocha-Santos, T. and A. C. Duarte (2015). "A critical overview of the analytical approaches to the occurrence, the fate and the behavior of microplastics in the environment." TrAC Trends in Analytical Chemistry **65**: 47-53

Rochman, C. M. (2013). "Long-Term Field Measurement of Sorption of Organic Contaminants to Five Types of Plastic Pellets: Implications for Plastic Marine Debris." ENVIRONMENTAL SCIENCE & TECHNOLOGY **47**(3): 1646-1654

Rochman, C. M. (2013). "Plastics and Priority Pollutants: A Multiple Stressor in Aquatic Habitats." Environmental Science & Technology **47**(6): 2439-2440

Rochman, C. M., M. A. Browne, B. S. Halpern, B. T. Hentschel, E. Hoh, H. K. Karapanagioti, L. M. Rios-Mendoza, H. Takada, S. Teh and R. C. Thompson (2013). "Classify plastic waste as hazardous." Nature **494**(7436): 169-171

Rochman, C. M., B. T. Hentschel and S. J. Teh (2014). "Long-Term Sorption of Metals Is Similar among Plastic Types: Implications for Plastic Debris in Aquatic Environments." Plos One **9**(1)

Rochman, C. M., E. Hoh, B. T. Hentschel and S. Kaye (2013). "Long-Term Field Measurement of Sorption of Organic Contaminants to Five Types of Plastic Pellets: Implications for Plastic Marine Debris." Environmental Science & Technology **47**(3): 1646-1654

Rochman, C. M., E. Hoh, T. Kurobe and S. J. Teh (2013). "Ingested plastic transfers hazardous chemicals to fish and induces hepatic stress." Scientific Reports **3**.

Rochman, C. M., C. Manzano, B. T. Hentschel, S. L. M. Simonich and E. Hoh (2013). "Polystyrene Plastic: A Source and Sink for Polycyclic Aromatic Hydrocarbons in the Marine Environment." Environmental Science & Technology **47**(24): 13976-13984

Rochman, C. M., A. Tahir, S. L. Williams, D. V. Baxa, R. Lam, J. T. Miller, F. C. Teh, S. Werorilangi and S. J. Teh (2015). "Anthropogenic debris in seafood: Plastic debris and fibers from textiles in fish and bivalves sold for human consumption." Scientific Reports **5**: 10.

Romeo, T., B. Pietro, C. Pedà, P. Consoli, F. Andaloro and M. C. Fossi (2015). "First evidence of presence of plastic debris in stomach of large pelagic fish in the Mediterranean Sea." Marine Pollution Bulletin(0).

Ross, P., R. DeSwart, R. Addison, H. VanLoveren, J. Vos and A. Osterhaus (1996). "Contaminant-induced immunotoxicity in harbour seals: Wildlife at risk?" Toxicology **112**(2): 157-169

Ryan, P. G. (2013). "A simple technique for counting marine debris at sea reveals steep litter gradients between the Straits of Malacca and the Bay of Bengal." Marine Pollution Bulletin **69**(1-2): 128-136

Ryan, P. G. (2014). "Litter survey detects the South Atlantic 'garbage patch'." Marine Pollution Bulletin **79**(1-2): 220-224

Ryan, P. G., H. Bouwman, C. L. Moloney, M. Yuyama and H. Takada (2012). "Long-term decreases in persistent organic pollutants in South African coastal waters detected from beached polyethylene pellets." Marine Pollution Bulletin **64**(12): 2756-2760

Ryan, P. G., A. D. Connell and B. D. Gardner (1988). "Plastic ingestion and PCBs in seabirds: Is there a relationship?" Marine Pollution Bulletin **19**(4): 174-176

Ryan, P. G., A. Lamprecht, D. Swanepoel and C. L. Moloney (2014). "The effect of fine-scale sampling frequency on estimates of beach litter accumulation." Marine Pollution Bulletin **88**(1-2): 249-254

Ryan, P. G. and C. L. Moloney (1990). "PLASTIC AND OTHER ARTIFACTS ON SOUTH-AFRICAN BEACHES - TEMPORAL TRENDS IN ABUNDANCE AND COMPOSITION." South African Journal of Science **86**(7-10): 450-452

Ryan, P. G., C. J. Moore, J. A. Van Franeker and C. L. Moloney (2009). "Monitoring the abundance of plastic debris in the marine environment." Philosophical Transactions of the Royal Society B: Biological Sciences **364**(1526): 1999-2012

Santos, I. R., A. C. Friedrich and F. P. Barretto (2005). "Overseas garbage pollution on beaches of northeast Brazil." Marine Pollution Bulletin **50**(7): 783-786

Satterfield, T., J. Conti, B. H. Harthorn, N. Pidgeon and A. Pitts (2013). "Understanding shifting perceptions of nanotechnologies and their implications for policy dialogues about emerging technologies." Science and Public Policy **40**(2): 247-260

Satterfield, T., M. Kandlikar, C. E. Beaudrie, J. Conti and B. H. Harthorn (2009). "Anticipating the perceived risk of nanotechnologies." Nature nanotechnology **4**(11): 752-758

SCBD (2012) Secretariat of the Convention on Biological Diversity and the Scientific and Technical Advisory Panel—GEF (2012). *Impacts of Marine Debris on Biodiversity: Current Status and Potential Solutions*, Montreal, Technical Series No. 67, 61 pages.

SDSN (2015) Indicators and a monitoring framework for the sustainable development goals, A report to the Secretary-General of the United Nations by the Leadership Council of the Sustainable Development Solutions Network, 233pp

Sekiguchi, T., A. Saika, K. Nomura, T. Watanabe, T. Watanabe, Y. Fujimoto, M. Enoki, T. Sato, C. Kato and H. Kanehiro (2011). "Biodegradation of aliphatic polyesters soaked in deep seawaters and isolation of poly(ε-caprolactone)-degrading bacteria." Polymer Degradation and Stability **96**(7): 1397-1403

Scheld, A. M., D. M. Bilkovic and K. J. Havens (2016). "The Dilemma of Derelict Gear." Scientific Reports **6**.

Shen, L., E. Worrell and M. K. Patel (2010). "Environmental impact assessment of man-made cellulose fibres." Resources, Conservation and Recycling **55**(2): 260-274

Sherrington, C., Darrah, C., Hann, S., Cole, G. and Corbin, M. (2016). Study to support the development of measures to combat a range of marine litter sources. Report for European Commission DG Environment, 432pp

Sindiku, O., J. Babayemi, O. Osibanjo, M. Schlummer, M. Schluep, A. Watson and R. Weber (2015). "Polybrominated diphenyl ethers listed as Stockholm Convention POPs, other brominated flame retardants and heavy metals in e-waste polymers in Nigeria." Environmental Science and Pollution Research **22**(19): 14489-14501

Slavin, C., A. Grage and M. L. Campbell (2012). "Linking social drivers of marine debris with actual marine debris on beaches." Marine Pollution Bulletin **64**(8): 1580-1588

Snoussi, M., E. Noumi, D. Usai, L. A. Sechi, S. Zanetti and A. Bakhrouf (2008). "Distribution of some virulence related-properties of Vibrio alginolyticus strains isolated from Mediterranean seawater (Bay of Khenis, Tunisia): investigation of eight Vibrio cholerae virulence genes." World Journal of Microbiology and Biotechnology **24**(10): 2133-2141

Steg, L., J. W. Bolderdijk, K. Keizer and G. Perlaviciute (2014). "An Integrated Framework for Encouraging Pro-environmental Behaviour: The role of values, situational factors and goals." Journal of Environmental Psychology **38**: 104-115

Steg, L. and C. Vlek (2009). "Encouraging pro-environmental behaviour: An integrative review and research agenda." Journal of Environmental Psychology **29**(3): 309-317

Sulochanan, B., A. Dineshbabu, R. Saravanan, G. S. Bhat and S. Lavanya (2014). "Occurrence of Noctiluca scintillans bloom off Mangalore in the Arabian Sea." Indian Journal of Fisheries **61**(1): 42-48

Sundt, P., Schulze, P-E. and Syversen, F. (2014). Sources of microplastic pollution to the environment. Norwegian Environment Agency, 108pp

Sussarellu, R., A. Huvet, S. Lapègue, V. Quillen, C. Lelong, F. Cornette, L. F. Jensen, N. Bierne and P. Boudry (2015). "Additive transcriptomic variation associated with reproductive traits suggest local adaptation in a recently settled population of the Pacific oyster, Crassostrea gigas." BMC Genomics **16**(1): 1-12

Szulc, > (2013). Collecting ghost nets in the Baltic Sea. Final report on the activities conducted in 2012. WWF Poland, 39pp

Takehama S. (1990) Estimation of damage to fishing vessels cause by marine debris, based on insurance statistics. In: Shomura R.S., Godfrey M.L. (Eds.), Proceedings of the Second International Conference on Marine Debris, Honolulu, Hawaii, 2-7 April 1989. US Department of Commerce, 792-809 (NOAA-TM-NMFS-SWFSC—154)

Talsness, C. E., A. J. M. Andrade, S. N. Kuriyama, J. A. Taylor and F. S. vom Saal (2009). "Components of plastic: experimental studies in animals and relevance for human health." Philosophical Transactions of the Royal Society B-Biological Sciences **364**(1526): 2079-2096

Tang, Z., Q. Huang, J. Cheng, Y. Yang, J. Yang, W. Guo, Z. Nie, N. Zeng and L. Jin (2014). "Polybrominated Diphenyl Ethers in Soils, Sediments, and Human Hair in a Plastic Waste Recycling Area: A Neglected Heavily Polluted Area." Environmental Science & Technology **48**(3): 1508-1516

Tanner, C. and S. W. Kast (2003). "Promotine sustainable consumption: Determinants of green purchases by Swiss consumers." Psychology & Marketing **20**(10): 883-902

Taylor, R. (1996). "Forms of capital and intrinsic values." Chemosphere **33**(9): 1801-1811

Ten Brink, P., I. Lutchman, S. Bassi, S. Speck, S. Sheavly, K. M. Register and C. Woolaway (2009). Guidelines on the use of market-based instruments to address the problem of marine litter.

Teuten, E. L., J. M. Saquing, D. R. U. Knappe, M. A. Barlaz, S. Jonsson, A. Bjorn, S. J. Rowland, R. C. Thompson, T. S. Galloway, R. Yamashita, D. Ochi, Y. Watanuki, C. Moore, H. V. Pham, T. S. Tana, M. Prudente, R. Boonyatumanond, M. P. Zakaria, K. Akkhavong, Y. Ogata, H. Hirai, S. Iwasa, K. Mizukawa, Y. Hagino, A. Imamura, M. Saha and H. Takada (2009). "Transport and release of chemicals from plastics to the environment and to wildlife." Philosophical Transactions of the Royal Society B-Biological Sciences **364**(1526): 2027-2045

Thomas, P. and M. S. Rahman (2010). "Region-wide impairment of Atlantic croaker testicular development and sperm production in the northern Gulf of Mexico hypoxic dead zone." Marine Environmental Research **69**: S59-S62

Thompson, R. C., Y. Olson, R. P. Mitchell, A. Davis, S. J. Rowland, A. W. G. John, D. McGonigle and A. E. Russell (2004). "Lost at Sea: Where Is All the Plastic?" Science **304**(5672): 838

Tran, N. K. and H.-D. Haasis (2015). "An empirical study of fleet expansion and growth of ship size in container liner shipping." International Journal of Production Economics **159**: 241-253

Trevail, A. M., G. W. Gabrielsen, S. Kuhn and J. A. Van Franeker (2015). "Elevated levels of ingested plastic in a high Arctic seabird, the northern fulmar (Fulmarus glacialis)." Polar Biology **38**(7): 975-981

Turner, R. K. and B. Fisher (2008). "Environmental economics - To the rich man the spoils." Nature **451**(7182): 1067-1068

UN (2011). The globally harmonised system of classification and labelling of chemicals (GHS). 4th Edition, United Nations, New York

UNEP (2014a). Emerging issues for Small Island Developing States. Results of the UNEP Foresight Process. United Nations Environment Programme (UNEP), Nairobi, 68pp

UNEP (2014b). Valuing Plastics: The Business Case for Measuring, Managing and Disclosing Plastic Use in the Consumer Goods Industry.

UNEP (2015a) Biodegradable Plastics and Marine Litter. Misconceptions, concerns and impacts on marine environments. United Nations Environment Programme (UNEP), Nairobi.

UNEP (2015b) Global waste management outlook. UNEP & ISWA, 346pp

UNEP (2016a in press) Marine litter prevention and waste management guidance manual: Best Available Techniques. United Nations Environment Programme (UNEP), Nairobi, 62pp

UNEP (2016b in press) Marine litter – a modelling study. United Nations Environment Programme (UNEP), Nairobi.

UNEP (2016c in press). Marine litter: socio-economic study. United Nations Environment Programme (UNEP), Nairobi.

UN HABITAT (2010) *Solid Waste Management in the World's Cities.* Earthscan.

Vallack, H. W., D. J. Bakker, I. Brandt, E. Broström-Lundén, A. Brouwer, K. R. Bull, C. Gough, R. Guardans, I. Holoubek and B. Jansson (1998). "Controlling persistent organic pollutants–what next?" Environmental Toxicology and Pharmacology **6**(3): 143-175

Van Cauwenberghe, L., M. Claessens, M. B. Vandegehuchte and C. R. Janssen (2015). "Microplastics are taken up by mussels (Mytilus edulis) and lugworms (Arenicola marina) living in natural habitats." Environmental Pollution **199**: 10-17

Van Cauwenberghe, L., L. Devriese, F. Galgani, J. Robbens and C. R. Janssen (2015). "Microplastics in sediments: A review of techniques, occurrence and effects" Marine Environmental Research **111**: 5-17

Van Cauwenberghe, L. and C. R. Janssen (2014). "Microplastics in bivalves cultured for human consumption." Environmental Pollution **193**: 65-70

Van Cauwenberghe, L., A. Vanreusel, J. Mees and C. R. Janssen (2013). "Microplastic pollution in deep-sea sediments." Environ Pollut **182**: 495-499

Van Franeker, J.A. (2010) Fulmar Litter EcoQO Monitoring in the Netherlands 1979-2008 in relation to EU Directive 2000/59/EC on Port Reception Facilities. IMARES Report Nr C027/10. IMARES Wageningen UR.

van Franeker, J. A., C. Blaize, J. Danielsen, K. Fairclough, J. Gollan, N. Guse, P.-L. Hansen, M. Heubeck, J.-K. Jensen, G. Le Guillou, B. Olsen, K.-O. Olsen, J. Pedersen, E. W. M. Stienen and D. M. Turner (2011). "Monitoring plastic ingestion by the northern fulmar Fulmarus glacialis in the North Sea." Environmental Pollution **159**(10): 2609-2615

van Franeker, J. A., C. Blaize, J. Danielsen, K. Fairclough, J. Gollan, N. Guse, P. L. Hansen, M. Heubeck, J. K. Jensen, G. Le Guillou, B. Olsen, K. O. Olsen, J. Pedersen, E. W. Stienen and D. M. Turner (2011). "Monitoring plastic ingestion by the northern fulmar Fulmarus glacialis in the North Sea." Environ Pollut **159**(10): 2609-2615

van Franeker, J. A. and K. L. Law (2015). "Seabirds, gyres and global trends in plastic pollution." Environmental Pollution **203**: 89-96

van Sebille, E., C. Wilcox, L. Lebreton, N. Maximenko, B. D. Hardesty, J. A. van Franeker, M. Eriksen, D. Siegel, F. Galgani and K. L. Law (2015). "A global inventory of small floating plastic debris." Environmental Research Letters **10**(12): 124006

Vandermeersch, G., H. M. Lourenço, D. Alvarez-Muñoz, S. Cunha, J. Diogène, G. Cano-Sancho, J. J. Sloth, C. Kwadijk, D. Barcelo and W. Allegaert (2015). "Environmental contaminants of emerging concern in seafood–European database on contaminant levels." Environmental Research **143**: 29-45

Vandermeersch, G., L. Van Cauwenberghe, C. R. Janssen, A. Marques, K. Granby, G. Fait, M. J. Kotterman, J. Diogène, K. Bekaert and J. Robbens (2015). "A critical view on microplastic quantification in aquatic organisms." Environmental Research **143**: 46-55

Vasseur, P. and C. Cossu-Leguille (2006). "Linking molecular interactions to consequent effects of persistent organic pollutants (POPs) upon populations." Chemosphere **62**(7): 1033-1042

Veenstra, T. S. and J. H. Churnside (2012). "Airborne sensors for detecting large marine debris at sea." Marine Pollution Bulletin **65**(1–3): 63-68

Veitayaki, J. (2010). Pacific Islands Drowning in their Waste: waste management issues that threaten sustainability. In: proceedings of International Seminar on Islands and Oceans. Ocean Policy Research Foundation, Nippon Foundation, pp. 19-33

Velzeboer, I., C. J. A. F. Kwadijk and A. A. Koelmans (2014). "Strong Sorption of PCBs to Nanoplastics, Microplastics, Carbon Nanotubes, and Fullerenes." Environmental Science & Technology **48**(9): 4869-4876

Venrick, E. L., T. W. Backman, W. C. Bartram, C. J. Platt, Thornhil.Ms and R. E. Yates (1973). "Man-made Objects on Surface of Central North-Pacific Ocean." Nature **241**(5387): 271-271

Verschoor, A. (2014). "Quick scan and Prioritization of Microplastic Sources and Emissions." RIVM Letter report 2014-0156

Vianello, A., A. Boldrin, P. Guerriero, V. Moschino, R. Rella, A. Sturaro and L. Da Ros (2013). "Microplastic particles in sediments of Lagoon of Venice, Italy: First observations on occurrence, spatial patterns and identification." Estuarine Coastal and Shelf Science **130**: 54-61

Vignola, R., S. Klinsky, J. Tam and T. McDaniels (2013). "Public perception, knowledge and policy support for mitigation and adaption to Climate Change in Costa Rica: Comparisons with North American and European studies." Mitigation and Adaptation Strategies for Global Change **18**(3): 303-323

Vignola, R., T. L. McDaniels and R. W. Scholz (2013). "Governance structures for ecosystem-based adaptation: Using policy-network analysis to identify key organizations for bridging information across scales and policy areas." Environmental Science & Policy **31**: 71-84

Walker, T. R., K. Reid, J. P. Y. Arnould and J. P. Croxall (1997). "Marine debris surveys at Bird Island, South Georgia 1990-1995." Marine Pollution Bulletin **34**(1): 61-65

Waluda, C. M. and I. J. Staniland (2013). "Entanglement of Antarctic fur seals at Bird Island, South Georgia." Marine Pollution Bulletin **74**(1): 244-252

Watnick, P. and R. Kolter (2000). "Biofilm, city of microbes." J Bacteriol **182**(10): 2675-2679

Watts, A. J. R., C. Lewis, R. M. Goodhead, S. J. Beckett, J. Moger, C. R. Tyler and T. S. Galloway (2014). "Uptake and Retention of Microplastics by the Shore Crab Carcinus maenas." Environmental Science & Technology.

Webber, D. N.; Parker, S. J. (2012) Estimating Unaccounted Fishing Mortality In The Ross Sea Region And Amundsen Sea (CCAMLR Subareas 88.1 And 88.2) Bottom Longline Fisheries Targeting Antarctic Toothfish, CCAMLR SCIENCE 19: 17-30

Weiss, B. (2006). "Anogenital Distance: Defining 'Normal"'. Environmental Health Perspectives **114**(7): A399-A399

Whittle, D. and O. R. Santos (2006). "Protecting Cuba's Environment: Efforts to Design and Implement Effective Environmental Laws and Policies in Cuba." Cuban studies **37**(1): 73-103

Widmer, W. M. and R. A. Reis (2010). "An Experimental Evaluation of the Effectiveness of Beach Ashtrays in Preventing Marine Contamination." Brazilian Archives of Biology and Technology **53**(5): 1205-1216

Wilcox, C., G. Heathcote, J. Goldberg, R. Gunn, D. Peel and B. D. Hardesty (2015). "Understanding the sources and effects of abandoned, lost, and discarded fishing gear on marine turtles in northern Australia." Conservation Biology **29**(1): 198-206

Wilcox, C., E. Van Sebille and B. D. Hardesty (2015). "Threat of plastic pollution to seabirds is global, pervasive, and increasing." Proceedings of the National Academy of Sciences **112**(38): 11899-11904

Woodall, L. C., C. Gwinnett, M. Packer, R. C. Thompson, L. F. Robinson and G. L. Paterson (2015). "Using a forensic science approach to minimize environmental contamination and to identify microfibres in marine sediments." Marine pollution bulletin.

Woodall, L. C., L. F. Robinson, A. D. Rogers, B. E. Narayanaswamy and G. L. Paterson (2015). "Deep-sea litter: a comparison of seamounts, banks and a ridge in the Atlantic and Indian Oceans reveals both environmental and anthropogenic factors impact accumulation and composition." Frontiers in Marine Science **2**: 3

Woodall, L. C., A. Sanchez-Vidal, M. Canals, G. L. J. Paterson, R. Coppock, V. Sleight, A. Calafat, A. D. Rogers, B. E. Narayanaswamy and R. C. Thompson (2014). The deep sea is a major sink for microplastic debris.

World Economic Forum, Ellen MacArthur Foundation and McKinsey & Company (2016). “The New Plastics Economy — Rethinking the future of plastics”.

WSC (2014). Survey results for containers lost at sea – 2014 update. World Shipping Council, 3pp

Wu, N., T. Herrmann, O. Paepke, J. Tickner, R. Hale, E. Harvey, M. La Guardia, M. D. McClean and T. F. Webster (2007). "Human exposure to PBDEs: Associations of PBDE body burdens with food consumption and house dust concentrations." Environmental Science & Technology **41**(5): 1584-1589

Wyles, K. J., S. Pahl and R. C. Thompson (2014). "Perceived risks and benefits of recreational visits to the marine environment: Integrating impacts on the environment and impacts on the visitor." Ocean & Coastal Management **88**: 53-63

Yang, D., H. Shi, L. Li, J. Li, K. Jabeen and P. Kolandhasamy (2015). "Microplastic Pollution in Table Salts from China." Environmental Science & Technology **49**(22): 13622-13627

Zardus, J. (2008). "The silent deep: the discovery, ecology and conservation of the deep sea, by Tony Koslow." Marine Biology Research **4**(3)

Zardus, J. D., B. T. Nedved, Y. Huang, C. Tran and M. G. Hadfield (2008). "Microbial biofilms facilitate adhesion in biofouling invertebrates." The Biological Bulletin **214**(1): 91-98

Zettler, E. R., T. J. Mincer and L. A. Amaral-Zettler (2013). "Life in the "Plastisphere": Microbial Communities on Plastic Marine Debris." Environmental Science & Technology **47**(13): 7137-7146