Supplementary Material

Supplementary material to Sample size requirements for riverbank macrolitter characterization

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1   A: Riverbank characteristic

Table 1. Overview of riverbank characteristic. The length and width of the collection area each month is available in the repository 4.TU DOI 10.4121/19188131

Location	coordinates	River	Nearby city	Location along river	Distance to mouth (km)	Bank type	Number of measurements (incl dimensions and weight)
R1	51.85359, 5.85864	Rhine (Waal)	Nijmegen	Upstream	130	Sand floodplain, recreational	12 (7)
R2	51.95984, 5.93776	Rhine (Nederrijn)	Arnhem	Midpoint	130	Sandy floodplain, light vegetation	2 (1)
R3	51.8981, 4.4674	Rhine	Rotterdam	Downstream	30	Embanked, stones and lightly vegetated	12 (7)
M1	50.85363, 5.6976	Meuse	Maastricht	Upstream	250	Vegetated	11 (9)
M2	51.79533, 5.66357	Meuse	Ravenstein	Midpoint	138	Vegetated	12 (7)
M3	51.71166, 4.63603	Meuse	Moerdijk	Downstream	56	Vegetated, stones	12 (7)
IJ1	51.96666, 5.95598	IJssel	Arnhem	Upstream	125	Sandy floodplain, light vegetation.	12 (7)
IJ2	52.5603, 5.91998	IJssel	Kampen	Downstream	16	Embanked, stones and reed vegetation	12 (7)

2   B: Riverbank tally form

Table 2. Field tally form using an OSPAR-ID to identify 111 item categories.

Name river	
Province	
Area ID	
Date riverbank sampling	
Name Researcher #1	
Name Researcher #2	
Name Researcher #3	

Riverbank side	Left / Right
Sampling executed?	Yes / No
↳ if not, why?	
Length sampled area (m)	
Width sampled area (m)	

OSPAR ID	Plastic and foam	Count
15	Caps and lids	
4.2	Bottles (<0.5 litre)	
4.1	Bottles (>0.5 litre)	
40	Industrial packages	
3	Small bags	
117.1	Hard fragments (<2.5 cm)	
46.1	Hard fragments (2.5 – 50 cm)	
47.2	Hard fragments (>50 cm)	
1172	Foams (<2.5 cm)	
462	Foams (2.5 – 50 cm)	
472	Foams (>50 cm)	
6.1	Foam food packages (e.g. hamburgers)	
212	Foam cups	
21	Drinking cups	
117.2	Soft fragments (i.e. foils) (<2.5 cm)	
46.2	Soft fragments (i.e. foils) (2.5 – 50 cm)	
47.1	Soft fragments (i.e. foils) (>50 cm)	
22.1	Plates & straws	
22.2	Mixing sticks (e.g. to stir your coffee)	
19	Food wrappers (multilayer) (e.g. chips)	
6	Food packages (e.g. snackbar fries box)	
4.3	Labels that were wrapped around bottles	
5	Packages from cleaning products	
1	Six-pack rings	
16	Lighters	
14	Parts from cars	
22	Cutlery	
481	Biofilm water filters	
36	Glow in the dark sticks	
38	Buckets	
38.1	Plant pots or trays	
43	Gun rounds	
25	Cleaning gloves (bit softer plastic)	
113	Professional gloves (bit harder plastic)	
42	Helmets	
10	Jerrycans	
11	Tubes of caulking (Dutch: *kitspuiten*)	
13	Crates	
39	Bands & tie wraps	
39.1	Tape (Dutch: *plakband*) & duct tape	
19.1	Lolly sticks	
8	Motor oil packages (<50 cm)	
9	Motor oil package (>50 cm)	
24	Net bags (e.g. nets for onions or fruit)	
2.1	Garbage bags	
17	Writing instruments (e.g. pens)	
20	Toys	
35	Fishing gear	
2	Big plastic bags	
31	Pieces of rope (diameter >1 cm)	
32	Pieces of rope (diameter <1 cm)	
35.1	Pieces of fishing line (nylon)	
43.1	Fireworks	
48	Other unidentifiable plastic items	

OSPAR ID	Rubber	Count
49	Balloons & ribbons	
52	Tires (e.g. from bikes or cars)	
53	Other unidentifiable rubber items	

OSPAR ID	Textile	Count
54	Clothes	
57/44	Shoes, boots & flipflops	
55	Pieces of carpet	
59	Other unidentifiable textile items	

OSPAR ID	Paper	Count
62.1	Carton drinking packages (e.g. milk)	
67.1	Other unidentifiable paper items	
64	Cigarette filters ("cigarette butts")	
63	Cigarette packages	
61	Carton	
65	Carton drinking cups	
66	Newspapers	
60	Bags	
67	Other unidentifiable paper items	

OSPAR ID	Wood	Count
72	Ice cream sticks	
68	Corks	
73	Paint brushes	
69	Pallets	
74	Other unidentifiable wood items (<50 cm)	
75	Other unidentifiable wood items (>50 cm)	

OSPAR ID	Metal	Count
81	Aluminium foils	
81.1	Capsules (e.g. coffee or coffee-milk)	
78	Soda cans	
79	Electrical wires	
83	Old metal (iron) (e.g. pipes)	
77	Caps (Dutch: *kroonkurken*) & beer caps	
84	Oil drums (Dutch: *olie vaten*)	
88	Barbed wires (Dutch: *prikkeldraad*)	
76	Spray cans	
86	Paint cans	
80	Fish lead	
82	Food cans	
120	Single use BBQ's/grills	
89	Other unidentifiable metal items (<50 cm)	
90	Other unidentifiable metal items (>50 cm)	

OSPAR ID	Glass	Count
91	Bottles (e.g. wine) & pots	
92	Light bulbs & (fluorescent) tube TL lamps	
93	Other unidentifiable glass items	

OSPAR ID	Sanitary	Count
7	Cosmetic packages (e.g. shampoo, deo)	
98	Plastic cotton swabs	
982	Wooden cotton swabs	
102.2	Wet tissues	
97	Condoms	
99	Sanitary towels & packages thereof	
18	Plastic hairbrush or hair comb	
100	Tampons & tampon applicators	
102.3	Pieces of toilet paper	
101	Toilet refreshers	
102	Other unidentifiable sanitary items	

OSPAR ID	Medical	Count
103	Packages (e.g. pills, contacts)	
104	Injection needles / syringes	
105	Other unidentifiable medical items	

OSPAR ID	Nurdles	Count
	Nurdles (per area of 50 by 50 cm)	

Notes ....

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3   C: Summarizing statistics

Table 3. summarizing statistics of each litter category. The dataset consists of 16,488 items and their river-OSPAR category (see supplementary materials B). For 14,052 items the length, width and mass are documented. Std indicates standard deviation.

catagory	Name	ospar ID	amount	mean mass (g)	std mass (g)	mean length (cm)	std length (cm)	mean width (cm)	std width (cm)
plastic	Caps and lids	15	385	3.56	5.67	4.06	2.25	3.48	2.42
	Bottle (< 0.5 L)	4.2	169	51.34	53.77	16.77	7.45	10.65	3.21
	Bottle (>= 0.5 L)	4.1	49	142.97	32.51	25.74	2.52	10.45	2.18
	Industrial packaging	40	49	54.42	67.96	66.28	56.53	24.79	12.45
	Small bag	3	74	20.55	15.55	25.55	9.58	18.64	9.10
	Hard fragment (< 2.5 cm)	117.1	393	0.27	0.30	1.70	0.80	1.12	0.49
	Hard fragment (>= 2.5 cm)	46.1	1329	10.24	32.05	7.02	6.43	3.82	4.95
	Hard fragment (>50 cm)	47.2	25	378.57	9.65	74.93	23.10	25.00	1.59
	Foam fragment (< 2.5 cm)	1172	1178	0.11	0.13	1.88	0.75	1.58	0.70
	Foam fragment (>=2.5 cm)	462	2615	2.49	13.01	5.09	3.80	4.06	4.43
	Foam (> 50 cm)	472	8	14.79	9.52	77.49	23.32	7.80	3.89
	Foam food packaging	6.1	55	3.66	2.94	10.75	3.27	9.01	1.46
	Foam cup	212	2	5.63	2.72	5.00	0.00	5.00	0.00
	Cup	21	130	3.07	4.97	8.40	2.51	6.02	3.75
	Soft fragment (< 2.5 cm)	117.2	302	0.08	0.12	2.17	0.96	1.30	0.65
	Soft fragment (>= 2.5 cm)	46.2	2359	1.88	5.03	14.39	14.47	7.52	8.10
	Soft fragment (>50 cm)	47.1	75	35.75	45.89	63.33	25.22	29.24	19.69
	Straw	22.1	89	1.60	1.24	15.68	3.23	1.25	1.13
	Swizzle stick	22.2	4	0.38	0.12	8.70	2.90	0.80	0.28
	Food wrapping	19	1065	2.48	7.16	9.61	6.44	5.55	4.72
	Food packaging	6	228	14.31	18.61	10.06	5.27	7.72	3.61
	Bottle label	4.3	30	4.15	6.80	14.46	8.05	10.76	7.86
	Cleaning product packaging	5	6	28.10	25.23	20.33	5.16	9.83	1.75
	Six pack ring	1	4	3.57	0.43	19.50	1.12	11.42	3.33
	Lighter	16	41	11.11	1.96	7.47	1.23	3.93	0.89
	Car part	14	7	110.87	45.66	13.48	4.22	5.88	2.85
	Cutlery	22	10	1.53	0.57	7.08	1.01	3.78	0.13
	Straw	22.1	89	1.60	1.24	15.68	3.23	1.25	1.13
	Water filter	481	0	NaN	NaN	NaN	NaN	NaN	NaN
	Glowstick	36	5	2.72	1.57	14.70	8.06	0.40	0.00
	Bucket	38	4	101.85	79.76	19.55	1.30	14.78	1.30
	Plastic plant pot	38.1	10	52.31	49.64	15.15	6.31	11.70	4.30
	Rifle cartridge case	43	6	2.82	0.20	4.40	0.92	2.20	0.28
	Cleaning glove	25	3	6.47	2.87	12.30	2.33	11.40	6.93
	Glove	113	0	NaN	NaN	NaN	NaN	NaN	NaN
	Helmet	42	0	NaN	NaN	NaN	NaN	NaN	NaN
	Jerrycan	10	2	201.19	0.00	31.00	0.00	19.75	0.00
	Caulking nozzle	11	1	84.50	0.00	21.50	0.00	6.00	0.00
	Plastic crate	13	0	NaN	NaN	NaN	NaN	NaN	NaN
	Cable tie	39	44	2.61	2.56	44.12	41.56	16.18	24.59
	Tape	39.1	30	2.98	3.41	9.37	5.35	7.80	3.52
	Lollipop stick	19.1	126	0.35	0.21	6.18	1.68	1.39	0.94
	Motor oil packaging (< 50 cm	8	0	NaN	NaN	NaN	NaN	NaN	NaN
	Motor oil packaging (>= 50 c	9	0	NaN	NaN	NaN	NaN	NaN	NaN
	Net bag	24	6	3.63	0.23	25.10	1.06	5.70	0.00
	Garbage bag	2.1	86	27.90	24.00	42.74	26.80	29.93	20.08
	Pen	17	10	4.69	1.58	7.43	2.48	4.43	0.18
	Toy	20	20	65.90	97.03	7.74	5.96	6.32	6.45
	Fishing gear	35	33	6.74	3.83	7.67	6.31	6.67	4.27
	Plastic bag	2	11	72.74	17.09	51.96	3.57	41.26	4.88
	Rope D>1cm	31	38	143.09	123.53	141.45	73.32	3.12	4.65
	Rope D<1cm	32	190	15.47	44.59	39.07	44.26	3.77	8.74
	Fishing wire	35.1	93	0.98	1.97	33.41	14.81	1.46	2.61
	Firework	43.1	10	7.12	3.39	7.33	2.18	1.71	0.80
	Nurdles	0	140	0.02	0.01	0.34	0.02	0.31	0.03
	Other	48	103	113.07	248.02	23.71	37.71	13.98	26.83

Category	Item								
rubber	Balloon	49	35	2.42	0.43	8.67	1.55	4.94	1.00
	Tire	52	11	646.79	315.76	46.11	14.81	17.41	11.15
	Other rubber	53	51	36.33	57.50	14.21	9.28	4.03	3.43
textile	Clothes	54	40	117.60	60.95	25.04	7.30	19.36	9.89
	Shoes, boots, flipflops	57	3	116.38	0.00	21.70	0.00	7.50	0.00
	Pieces of carpet	55	1	220.00	0.00	96.00	0.00	34.00	0.00
	Other unidentifiable textile	59	141	124.23	295.43	47.25	58.47	16.62	19.72
paper	Drink carton	62.1	14	46.29	11.86	17.07	4.59	10.54	2.84
	Other paper	67.1	93	1.59	1.63	6.79	5.14	4.30	3.39
	Cigarette filter	64	1665	0.50	0.19	2.36	0.38	0.91	0.29
	Cigarette pack	63	15	7.60	1.64	12.73	1.93	8.47	0.47
	Cartboard	61	19	30.68	5.32	15.60	1.36	9.00	3.41
	Cartboard cup	65	9	21.57	3.28	11.18	2.01	10.31	1.00
	Newspaper	66	3	NaN	NaN	NaN	NaN	NaN	NaN
	Paper bag	60	3	NaN	NaN	NaN	NaN	NaN	NaN
	Other paper	67	96	5.00	4.70	9.92	3.89	12.70	6.29
wood	Popsicle stick	72	2	2.03	0.40	11.00	1.41	1.00	0.00
	Cork	68	35	7.52	4.88	3.75	0.99	2.53	1.16
	Paintbrush	73	0	NaN	NaN	NaN	NaN	NaN	NaN
	Pellet	69	0	NaN	NaN	NaN	NaN	NaN	NaN
	Other wood (< 50 cm)	74	50	479.62	123.41	15.12	5.38	9.70	3.32
	Other wood (>= 50 cm)	75	10	986.94	501.02	45.45	5.35	4.88	0.75
metal	Aluminium foil	81	109	5.14	6.44	4.91	3.15	3.04	1.50
	Metal capsule	81.1	5	10.21	0.00	4.47	0.00	4.93	0.00
	Drink can	78	243	42.55	43.47	9.71	3.36	7.14	2.35
	Electrical wire	79	6	4.79	0.16	14.12	0.52	0.96	0.40
	Old iron scrap	83	25	597.34	623.46	59.06	45.15	24.50	21.82
	Metal bottle cap	77	700	4.09	1.03	2.73	0.34	2.42	0.64
	Oil drum	84	0	NaN	NaN	NaN	NaN	NaN	NaN
	Barbed wire	88	2	3.46	1.84	37.75	42.78	0.15	0.07
	Spray can	76	12	137.42	69.88	17.22	3.47	8.39	3.15
	Paint can	86	0	NaN	NaN	NaN	NaN	NaN	NaN
	Fish lead	80	2	38.83	0.00	14.10	0.00	2.30	0.00
	Food can	82	7	22.19	6.08	7.07	1.60	8.95	2.05
	Single use grill	120	0	NaN	NaN	NaN	NaN	NaN	NaN
	Other metal (< 50 cm)	89	177	150.69	199.11	13.43	10.00	4.87	3.50
	Other metal (>= 50 cm)	90	15	882.52	566.82	58.68	29.70	20.69	12.00
glass	Glass bottles and ceramics	91	501	42.77	67.28	6.11	4.50	3.86	3.09
	Tube lamp	92	0	NaN	NaN	NaN	NaN	NaN	NaN
	Other glass	93	119	62.70	76.61	5.14	2.80	3.53	2.10
sanitary	Cosmetics	7	21	20.65	14.98	10.07	2.84	4.34	1.77
	Cotton swab	98	220	0.65	4.23	6.44	1.50	0.24	0.06
	Carton cotton swab	982	4	NaN	NaN	NaN	NaN	NaN	NaN
	Wet tissue	102.2	247	6.87	7.09	18.99	8.88	7.21	5.10
	Condom	97	1	0.21	0.00	4.50	0.00	4.50	0.00
	Sanitary towel	99	42	2.47	1.74	18.06	8.36	7.02	3.68
	Hair brush	18	0	NaN	NaN	NaN	NaN	NaN	NaN
	Tampon (applicator)	100	14	1.22	0.05	5.51	0.32	1.79	0.19
	Toilet paper	102.3	6	3.83	1.85	12.67	4.04	4.17	1.04
	Toilet refresher	101	1	9.86	0.00	11.50	0.00	10.30	0.00
	Other sanitary	102	18	9.07	9.70	15.21	5.87	8.36	6.28
medical	Medical packaging	103	10	4.90	9.38	5.96	2.15	2.49	1.07
	Syringe	104	8	10.65	10.34	9.35	1.75	2.45	0.28
	Other medical	105	25	8.86	0.42	8.29	3.25	10.09	0.99

# 4 D: Top 10 per location and per month
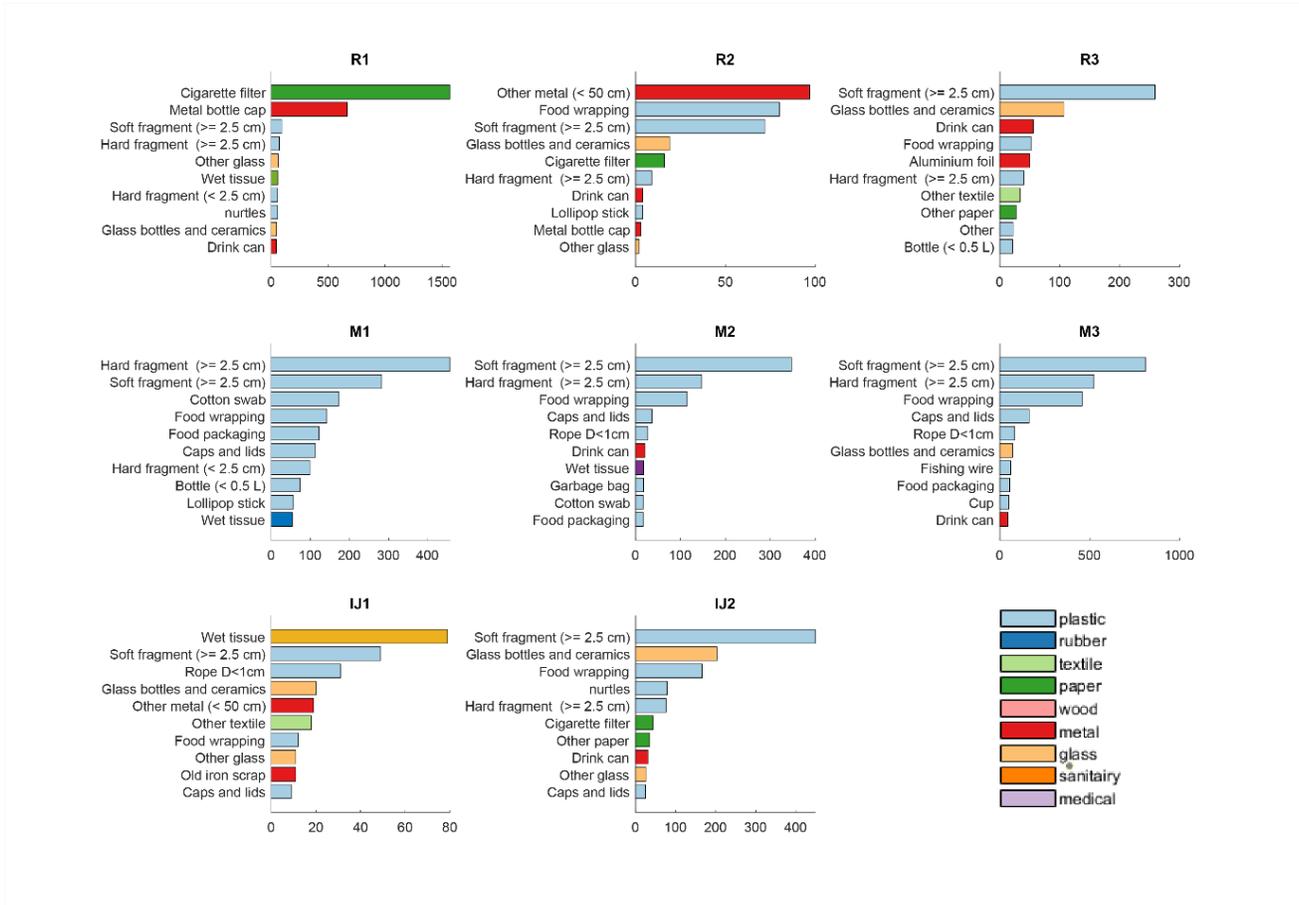
Figure 1. List of top 10 most frequent found items based on item amount, per location.
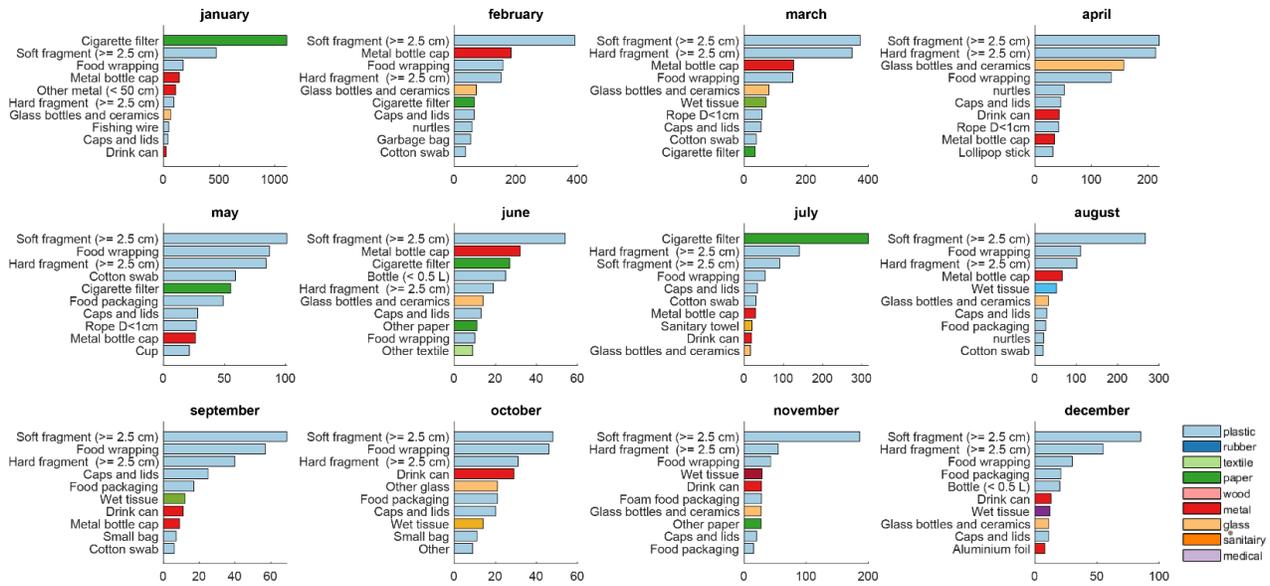
Figure 2. List of top 10 most frequent found items based on item amount, per month.

5   E: Length and mass distribution

Besides expressing anthropogenic litter in terms of mass and item count, item sizes can be used to get an estimation of for example the environmental impact, the amount of ingestible litter, and monitoring net mesh sizes. For describing item size for a river system or a riverbank, cumulative item size distributions for count and mass can be used (Figure 3). Item sizes between 2.0 - 20 cm fall within the 10 and 90-percentile of item count, however those item sizes only represent 36% of the item mass. To capture all mass in the same range, item sizes included are 6.6 - 124 cm (capturing 70% of all items). Unlike plastic found in oceans (Lebreton et al., 2018), and similar to other riverine studies (van Emmerik et al., 2018), most mass is found in the middle percentiles (D_{25}-D_{75}) and not in the largest item sizes (>100 cm; Supplementary materials E).

The size distribution varied between places (mean length 4.1 – 18 cm, median length 2.5 – 8.5 cm), and certain locations such as R1, have a smaller size distribution than other locations (Figure 3). This could be an indication of fragmentation or a different item source, and in case of location R1 it can be attributed to the large amount of cigarette butts (Supplementary materials D). The difference between areas stresses the importance to determine the distinct length distribution of the area.
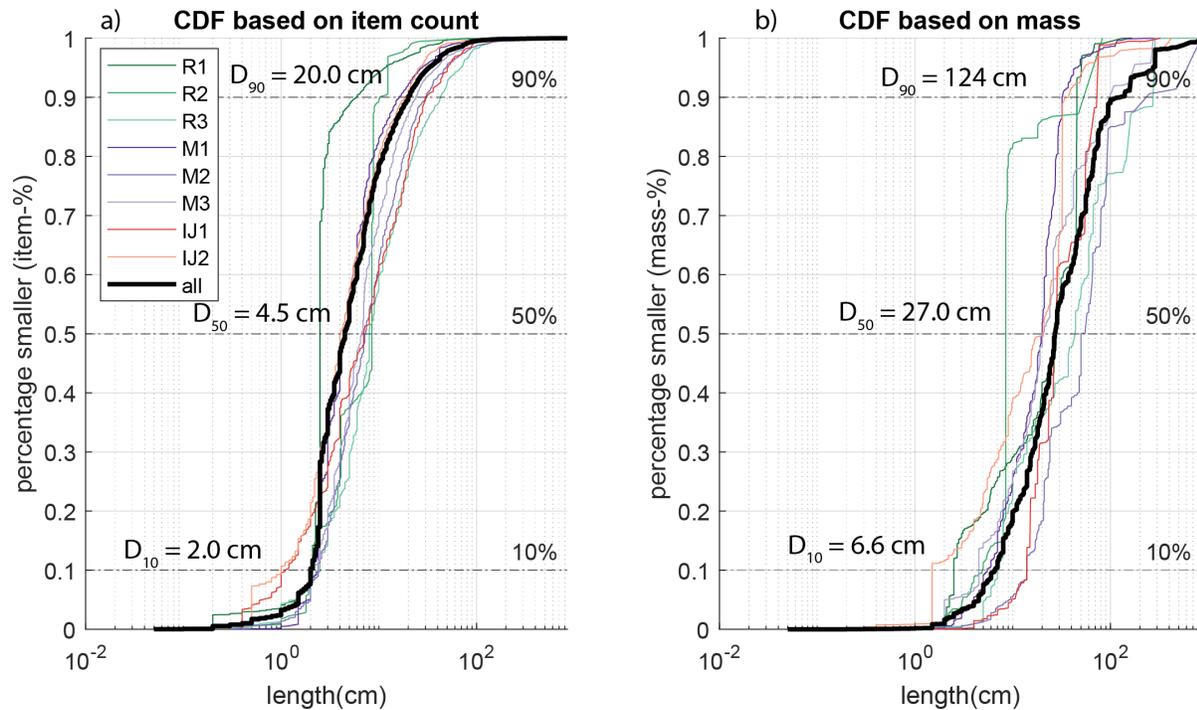
Figure 3. Cumulative density distribution (CDF) based on item count (a) and mass (b) for all study areas. D_{10}, D_{50} and D_{90} of the sum of all study areas (indicated as "all") are shown.

To break down the shown cumulative density distribution, items were subdivided into size classes, and the resulting size distribution, per mass and item amount, give insight in the dominating litter size (Figure 4). The characteristics of individual items are reflected in the size distribution. This resulted in for example a relatively large amount of mass in the 1.5-5 cm class in Nijmegen, due to the large amount of cigarette filters found here.

Most found items consisted of plastic (70%). To give insights into the build-up of plastic litter, an additional analysis was focused on plastic polymer category. Items were classified in eight polymer categories, based on the Crowd-Water classification protocol (van Emmerik et al., 2020): Polyethylene terephthalate (PET; e.g. bottles), polystyrene (PS, e.g. cutlery, cups, toys), expanded polystyrene (EPS, e.g. foams, food boxes), hard polyolefin (POhard, e.g. bottle caps, containers, rigid items), Soft polyolefin (POsoft, e.g. bags, foils), multilayer (ML, e.g. combined materials, food wrappings and packaging), other plastic, and no plastic (e.g. wood, paper, glass).
To explore the influence of item types on the size distribution, the item categories were broken down in 8 polymeric plastic types (Figure 5). Relatively homogeneous categories such as PET showed a narrow size distribution, while broad categories such as 'other plastic' had a wider distribution. Based on the mass-size-distribution, a clean-up protocol can be improved. For example, a location with mostly PET pollution has a clear size signature, on which the protocol can be based.
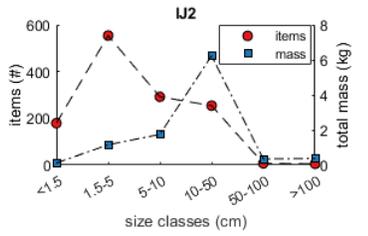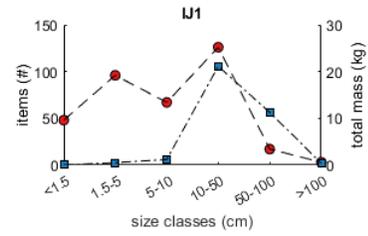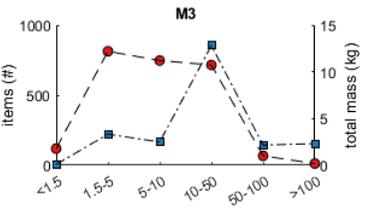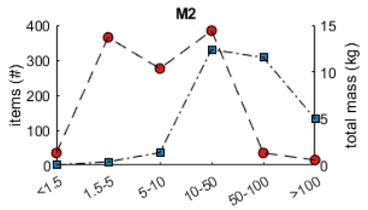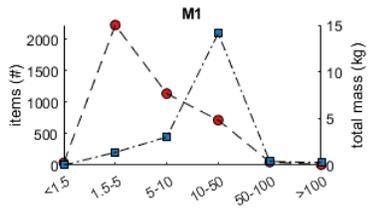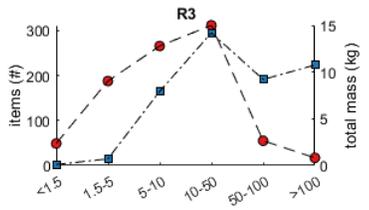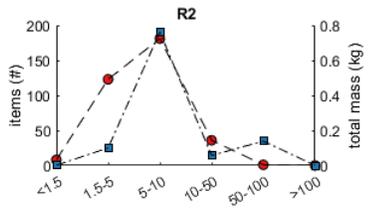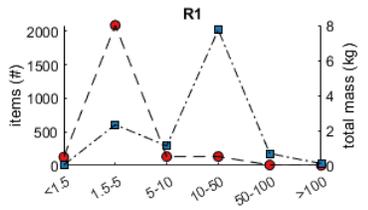
Figure 4. Size distribution, per mass and item amount, of litter found at all location.
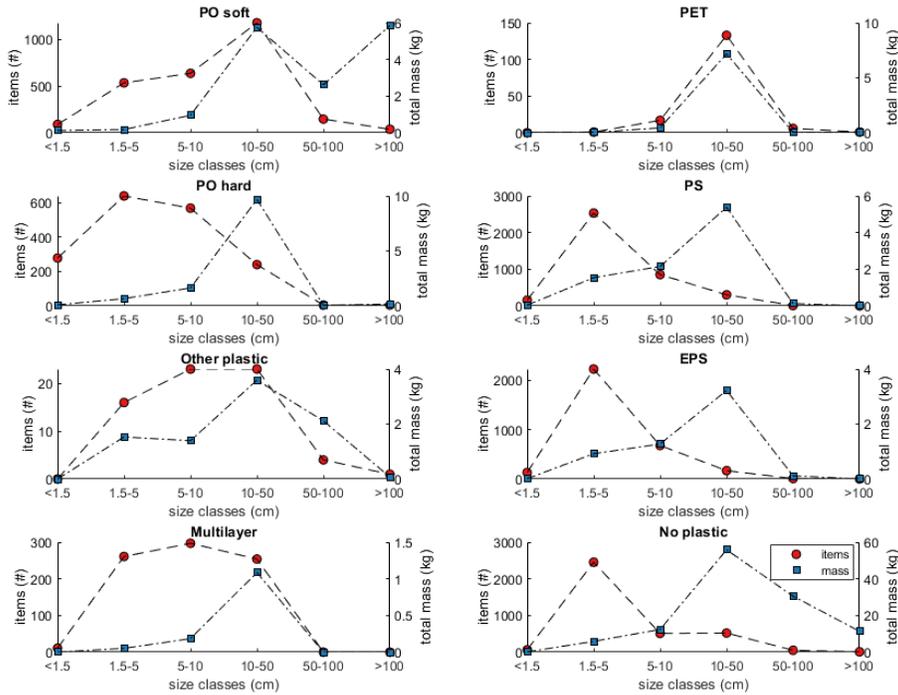

Figure 5. Size distribution, per mass and item amount, of plastic litter subdivided in polymer categories.

6   F: Conversion table

Table 4. To facilitate direct comparison with other categorization methods in future research efforts, we included a 'conversion table" for rapid re-categorization in one of the other categorization methods.

ID	nameNL	nameEN	category OSPAR	Category plastic	Material type	Function	Plastic pirates	NOAA	Type code 1	Type code 2
1	plastic_6_packringen	Six pack ring	plastic	PO soft	plastic	Consumer	Plastic	6-pack rings	pl	fc
2	plastic_tassen	Plastic bag	plastic	PO soft	plastic	Consumer	Plastic	Bags	pl	re
3	plastic_kleine_plastic_tasjes	Small bag	plastic	PO soft	plastic	Consumer	Plastic	Bags	pl	re
4.1	plastic_drankflessen_groterdan_halveliter	Bottle (>= 0.5 L)	plastic	PET	plastic	Packaging	Plastic	Beverage bottles	pl	fc
4.2	plastic_drankflessen_kleinerdan_halveliter	Bottle (<0.5 L)	plastic	PET	plastic	Packaging	Plastic	Beverage bottles	pl	fc
4.3	plastic_wikkels_van_drankflessen	Bottle label	plastic	PO soft	plastic	Packaging	Plastic	Beverage bottles	pl	fc
5	plastic_verpakking_van_schoonmaakmiddelen	Cleaning product packaging	plastic	PO hard	plastic	Packaging	Plastic	Other/unclassifiable	pl	hy
6	plastic_voedselverpakkingen_frietbakjes_etc	Food packaging	plastic	PS	plastic	Packaging	Plastic	Food wrappers	pl	fc
7	plastic_cosmeticaverpakkingen	Cosmetics packaging	plastic	PO hard	plastic	Packaging	Plastic	Personal care products	pl	hy
8	plastic_motorolieverpakking_kleinerdan50cm	Motor oil packaging (<50 cm)	plastic	PO hard	plastic	Industrial	Plastic	Other/unclassifiable	pl	vk
9	plastic_motorolieverpakking_groterdan50cm	Motor oil packaging (>=50 cm)	plastic	PO hard	plastic	Industrial	Plastic	Other/unclassifiable	pl	vk
10	plastic_jerrycans	Jerrycan	plastic	PO hard	plastic	Packaging	Plastic	Other jugs and containers	pl	nn
13	plastic_kratten	Plastic crate	plastic	PO hard	plastic	Fishery	Plastic	Other/unclassifiable	pl	fi
14	plastic_auto_onderdelen	Car part	plastic	PO hard	plastic	Industrial	Plastic	Other/unclassifiable	pl	vk
15	plastic_doppen_en_deksels	Caps and lids	plastic	PS	plastic	Packaging	Plastic	Bottle or container caps	pl	fc
16	plastic_aanstekers	Lighter	plastic	PO hard	plastic	Consumer	Plastic	Disposable cigarette lighters	pl	sm
20	plastic_speelgoed	Toy	plastic	PS	plastic	Consumer	Plastic	Other/unclassifiable	pl	re
21	plastic_plastic_bekers_of_delen_daarvan	Cup	plastic	PS	plastic	Consumer	Plastic	Cups	pl	fc
24	plastic_netzakken	Net bag	plastic	PO soft	plastic	Packaging	Plastic	Other/unclassifiable	pl	nn
25	plastic_handschoenen_huishoudelijk	Cleaning glove	plastic	PO soft	plastic	Consumer	Plastic	Other/unclassifiable	pl	hy
113	plastic_handschoenen_professioneel	Glove	plastic	PO soft	plastic	Industrial	Plastic	Other/unclassifiable	pl	co
31	plastic_touw_diameter_groterdan_1cm	Rope D>1cm	plastic	PO soft	plastic	Industrial	Plastic	Plastic rope/small net pieces	pl	nn
32	plastic_touw_diameter_kleinerdan_1cm	Rope D<1cm	plastic	PO soft	plastic	Industrial	Plastic	Plastic rope/small net pieces	pl	nn
35	plastic_sportvisspullen	Fishing gear	plastic	PO soft	plastic	Fishery	Plastic	Other/unclassifiable	pl	fi
36	plastic_breekstaafjes	Glowstick	plastic	PO hard	plastic	Fishery	Plastic	Other/unclassifiable	pl	re
38	plastic_emmers	Bucket	plastic	PO hard	plastic	Industrial	Plastic	Other/unclassifiable	pl	nn
40	plastic_industrieel_verpakkingsmateriaal	Industrial packaging	plastic	PO shoft	plastic	Packaging	Plastic	Other/unclassifiable	pl	nn
42	plastic_helmen	Helmet	plastic	PO hard	plastic	Industrial	Plastic	Other/unclassifiable	pl	co
43	plastic_geweerpatronen	Rifle cartridge case	plastic	PO hard	plastic	Consumer	Plastic	Other/unclassifiable	pl	hu
117.1	plastic_plastic_stukjes_0_2_5cm_hard_plastic	Hard fragment (<2.5 cm)	plastic	PO hard	plastic	Unknown	Plastic	Plastic fragments hard	pl	nn
46.1	plastic_plastic_stukjes_2_5_50cm_hard_plastic	Hard fragment (>= 2.5 cm)	plastic	PO hard	plastic	Unknown	Plastic	Plastic fragments hard	pl	nn
117.2	plastic_plastic_stukjes_0_2_5cm_zacht_plastic	Soft fragment (< 2.5 cm)	plastic	PO soft	plastic	Unknown	Plastic	Plastic fragments film	pl	nn
46.2	plastic_plastic_stukjes_2_5_50cm_zacht_plastic	Soft fragment (>= 2.5 cm)	plastic	PO soft	plastic	Unknown	Plastic	Plastic fragments film	pl	nn
								Plastic other; Buoys & floats; Balloons -	pl	
48	plastic_overig_plastic	Other	plastic	Other plastic	plastic	Other	Plastic	Mylar	pl	nn
1172	plastic_piepschuim_0_2_5cm	Foam fragment (<2.5 cm)	plastic	EPS	plastic	Unknown	Plastic	Plastic fragment foamed	pl	nn
462	plastic_piepschuim_2_5_50cm	Foam fragment (>=2.5cm)	plastic	EPS	plastic	Unknown	Plastic	Plastic fragment foamed	pl	nn
6.1	plastic_piepschuim_voedselverpakkingen	Foam food packaging	plastic	EPS	plastic	Packaging	Plastic	Other/unclassifiable	pl	fc

Code	Name (NL)	Name (EN)	Material	Type	Material	Category	Class	Description		
47.1	plastic_plastic_folies_groterdan_50cm	Soft fragment (>50 cm)	plastic	PO soft	plastic	Unknown	Plastic	Plastic fragments film	pl	nm
47.2	plastic_hard_plastic_groterdan_50cm	Hard fragment (>50cm)	plastic	PO hard	plastic	Unknown	Plastic	Plastic fragments hard	pl	nm
22.1	plastic_rietjes	Straw	plastic	PS	plastic	Consumer	Plastic	Straws	pl	fc
19	plastic_snoep_snack_chipsverpakking	Food wrapping	plastic	Multilayer	plastic	Consumer	Plastic	Food wrappers	pl	fc
472	plastic_piepschuim_groterdan_50cm	Foam (>50cm)	plastic	EPS	plastic	Unknown	Plastic	Plastic fragment foamed	pl	nm
212	plastic_piepschuim_bekers	Foam cup	plastic	EPS	plastic	Consumer	Plastic	Cups	pl	fc
22	plastic_bestek	Cutlery	plastic	PS	plastic	Consumer	Plastic	Plastic utensils	pl	fc
481	plastic_biofilm_waterfiltertjes	Water filter	plastic	PO hard	plastic	Industrial	Plastic	Other/unclassifiable	pl	nm
11	plastic_kitspuiten	Caulking nozzle	plastic	PO hard	plastic	Construction	Plastic	Other/unclassifiable	pl	co
39	plastic_kunststof_band_tiewraps	Cable tie	plastic	PO hard	plastic	Industrial	Plastic	Other/unclassifiable	pl	co
19.1	plastic_lolliestokjes	Lollipop stick	plastic	PO hard	plastic	Consumer	Plastic	Other/unclassifiable	pl	fc
2.1	plastic_vuilniszakken	Garbage bag	plastic	PO soft	plastic	Consumer	Plastic	Other/unclassifiable	pl	nm
17	plastic_schrijfwaren	Pen	plastic	PO hard	plastic	Consumer	Plastic	Other/unclassifiable	pl	nm
35.1	plastic_visdraad	Fishing wire	plastic	PO soft	plastic	Fishery	Plastic	Fishing lures & lines	pl	fi
43.1	plastic_vuurwerk	Firework	plastic	PO hard	plastic	Consumer	Plastic	Other/unclassifiable	pl	nm
22.3	plastic_borden_new	Plastic plate	plastic	PS	plastic	Consumer	Plastic	Other/unclassifiable	pl	fc
22.2	plastic_roerstaafjes_new	Swizzle stick	plastic	PS	plastic	Consumer	Plastic	Other/unclassifiable	pl	fc
38.1	plastic_bloempotten_new	Plastic plant pot	plastic	PO hard	plastic	Consumer	Plastic	Other/unclassifiable	pl	ag
39.1	plastic_plakband_new	Tape	plastic	PO soft	plastic	Consumer	Plastic	Other/unclassifiable	pl	nm
49	rubber_ballonnen	Balloon	rubber	No plastic	rubber	Consumer	Other	Balloons - latex	ru	re
52	rubber_banden	Tire	rubber	No plastic	rubber	Other	Other	Tires	ru	vk
53	rubber_overig_rubber	Other rubber	rubber	No plastic	rubber	Other	Other	Rubber fragments/other; Rubber glove	ru	nm
54	textiel_kleding	Clothing	textile	No plastic	textile	textile	Other	Clothing & shoes	ct	cl
55	textiel_vloerbedekking	Carpet	textile	No plastic	textile	textile	Other	Other/unclassifiable	ct	co
57	textiel_schoeisel	Shoeware	textile	No plastic	textile	Consumer	Other	Clothing & shoes; Flipflops	ct	cl
59	textiel_overig_textiel	Other textile	textile	No plastic	textile	Other	Other	Other cloth/fabric; towels/rags; Fabric pieces; rope/net pieces (non nylon)	ct	nm
60	papier_tassen	Paper bag	paper	No plastic	paper	Consumer	Paper	Paper bags	pp	nm
61	papier_karton	Cardboard	paper	No plastic	paper	Other	Paper	paper and cardboard	pp	nm
63	papier_sigarettenverpakking	Cigarette pack	paper	No plastic	paper	Consumer	Paper	Other/unclassifiable	pp	sm
64	papier_sigarettenfilters	Cigarette filter	paper	No plastic	paper	Consumer	Cigarette	Cigarettes;Cigar tips	pp	sm
65	papier_kartonnen_bekers	Cardboard cup	paper	No plastic	paper	Consumer	Paper	Cups	pp	fc
66	papier_kranten	Newspaper	paper	No plastic	paper	Consumer	Paper	Other/unclassifiable	pp	re
67	papier_papier_overig	Other paper	paper	No plastic	paper	Other	Paper	Other/unclassifiable	pp	nm
62.1	papier_drankkarton	Drink carton	paper	No plastic	paper	Packaging	Paper	Cardboard cartons	pp	nm
67.1	papier_ondefinieerbaar	Other paper	paper	No plastic	paper	Unknown	Paper	Other/unclassifiable	pp	fc
68	hout_kurk	Cork	wood	No plastic	wood	Consumer	Other	Other/unclassifiable	wo	fc
69	hout_pellets	Pellet	wood	No plastic	wood	Industrial	Other	Other/unclassifiable	wo	co
72	hout_ijsstokjes	Popside stick	wood	No plastic	wood	Consumer	Other	Other/unclassifiable	wo	fc
73	hout_kwasten	Paintbrush	wood	No plastic	wood	Construction	Other	Other/unclassifiable	wo	co
74	hout_overig_hout_keinderdan_50cm	Other wood (<50 cm)	wood	No plastic	wood	Unknown	Other	Other wood;Lumber/building material	wo	nm
75	hout_overig_hout_groterdan_50cm	Other wood (>= 50 cm)	wood	No plastic	wood	Unknown	Other	Other wood	wo	nm
81	metaal_aluminiumfolie	Aluminium foil	metal	No plastic	metal	Other	Other	Other/unclassifiable	me	fc
81.1	metaal_capsules	Metal capsule	metal	No plastic	metal	Consumer	Metal	Other/unclassifiable	me	fc

78	metaal_drankblikjes	Drink can	metal	No plastic	metal	Metal	Packaging	Aluminum/tin cans	me	fc
79	metaal_elektriciteitsdraad	Electrical wire	metal	No plastic	metal	Metal	Electornic	Other/unclassifiable	me	co
83	metaal_oud_ijzer	Old iron scrap	metal	No plastic	metal	Metal	Unknown	Other/unclassifiable	me	nn
77	metaal_kroonkurken	Metal bottle cap	metal	No plastic	metal	Metal	Consumer	Other/unclassifiable	me	fc
84	metaal_oliedrum	Oil drum	metal	No plastic	metal	Metal	Industrial	Other/unclassifiable	me	nn
88	metaal_omheinigsdraad_prikkeldraad	Barbed wire	metal	No plastic	metal	Metal	Other	Other/unclassifiable	me	nn
76	metaal_spuitbussen	Spray can	metal	No plastic	metal	Metal	Construction	Aerosol cans	me	co
86	metaal_verfblik	Paint can	metal	No plastic	metal	Metal	Construction	Other/unclassifiable	me	co
80	metaal_vislood	Fish lead	metal	No plastic	metal	Metal	Fishery	Fishing lures & lines	me	fi
82	metaal_voedselblikken	Food can	metal	No plastic	metal	Metal	Consumer	Other/unclassifiable	me	fc
120	metaal_wegwerpbarbecues	Single use grill	metal	No plastic	metal	Metal	Consumer	Other/unclassifiable	me	fc
89	metaal_overig_metaal_kleinerdan_50cm	Other metal (< 50 cm)	metal	No plastic	metal	Metal	Unknown	Metal fragments/other	me	nn
90	metaal_overig_metaal_groterdan_50cm	Other metal (>= 50 cm)	metal	No plastic	metal	Metal	Unknown	Metal fragments/other	me	nn
91	glas_flessen_pottten	Glass bottles and ceramics	glass	No plastic	glass	Glass	Unknown	Other/unclassifiable	gc	fc
92	glas_lampen_tl_lampen	Tube lamp	glass	No plastic	glass	Glass	Consumer	Other/unclassifiable	gc	co
93	glas_overig_glas	Other glass	glass	No plastic	glass	Glass	Other	Other/unclassifiable	gc	nn
7	sanitair_cosmetica	Cosmetics	sanitary	PO Hard	plastic	Other	Consumer	Personal care products	pl	hy
98	sanitair_plastic_wattenstaafjes	Cotton swab	plastic	PO Hard	plastic	Other	Consumer	Personal care products	pl	hy
982	sanitair_kartonnen_wattenstaafjes	Carton cotton swab	sanitary	No plastic	paper	Other	Consumer	Personal care products	pp	hy
102.2	sanitair_vochtige_doekjes	Wet tissue	sanitary	No plastic	textile	Other	Consumer	Personal care products	ct	hy
97	sanitair_condooms	Condom	sanitary	rubber	rubber	Other	Consumer	Personal care products	ru	hy
99	sanitair_maandverband_en_verpakkingen_ervan	Sanitary towel	sanitary	No plastic	textile	Other	Consumer	Personal care products	ct	hy
18	sanitair_plastic_kam_borstel	Hair brush	plastic	PO Hard	plastic	Other	Consumer	Personal care products	pl	hy
100	sanitair_tampons_en_tamponapplicators	Tampon (applicator)	sanitary	No plastic	textile	Other	Consumer	Personal care products	ct	hy
102.3	sanitair_tissues_wc_papier	Toilet paper	sanitary	No plastic	textile	Other	Consumer	Personal care products	ct	hy
101	sanitair_toiletverfrissers	Toilet refresher	plastic	PO Hard	plastic	Other	Consumer	Personal care products	pl	hy
102	sanitair_overig_sanitair	Other sanitary	sanitary	No plastic	textile	Other	Other	Personal care products	ct	hy
103	medisch_verpakkingen	Medical packaging	plastic	Multilayer	plastic	Other	Consumer	Other/unclassifiable	pl	md
104	medisch_spuiten	Syringe	medical	PO Hard	plastic	Other	Consumer	Other/unclassifiable	pl	md
105	medisch_overig_medisch	Other medical	medical	No plastic	plastic	Other	Other	Other/unclassifiable	pl	md
0	nurdles	nurtles	plastic	PO hard	plastic	Other	Consumer	Other/unclassifiable	pl	nn

7   G: Sample set size requirements

Table 5. Sample set size requirements for all categories in our database with more than 10 items. Requirements are given for various confidence boundaries and deviations from mean. Red numbers indicate that the number of items needed to represent the mean mass is equal to the total number of items collected. N/A means that this level of uncertainty (confidence boundary and deviation from the mean) is never reached, and more items need to be collected.

						Deviation from mean											
						20%				10%				5%			
						Confidence boundary											
OSPAR-ID	Name	Total number of items	μ_mass (g)	σ_mass (g)	Ψ (-)	0.5	0.75	0.9	0.95	0.5	0.75	0.9	0.95	0.5	0.75	0.9	0.95
3	Small bag	44	12.5	26.4	2.1	30	36	39	40	34	39	42	43	38	41	43	44
4.1	Bottle (>= 0.5 L)	34	80.0	176.7	2.2	1	1	29	30	1	32	34	34	30	32	34	34
4.2	Bottle (< 0.5 L)	127	40.4	75.1	1.9	34	63	82	90	74	110	120	120	110	120	N/A	N/A
4.3	Bottle label	23	4.6	9.4	2.1	18	21	22	23	21	22	23	23	22	23	23	23
6	Food packaging	170	9.1	18.6	2.0	42	79	110	120	95	140	150	160	150	160	170	170
7	Cosmetics packaging	19	17.0	16.7	1.0	8	13	15	16	14	17	18	18	18	19	19	19
15	Caps and lids	300	3.2	7.5	2.4	50	130	170	190	160	220	250	260	240	270	290	300
16	Lighter	38	11.7	3.5	0.3	1	3	6	8	4	10	16	18	12	22	28	30
20	Toy	18	52.3	111.2	2.1	14	16	18	18	15	17	18	18	17	18	18	18
21	Cup	116	3.2	7.7	2.5	51	77	90	95	88	110	110	N/A	110	110	N/A	N/A
31	Rope D>1cm	29	216.0	340.2	1.6	16	22	25	26	24	27	28	29	28	29	29	29
32	Rope D<1cm	170	11.0	88.5	8.1	1	150	170	170	130	150	170	170	140	160	170	170
35	Fishing gear	20	6.6	5.4	0.8	6	11	14	16	13	17	18	19	18	20	20	20
40	Industrial packaging	39	51.1	169.6	3.3	1	35	38	38	32	35	38	38	35	37	39	39
117.1	Hard fragment (< 2.5 cm)	323	0.3	0.4	1.4	21	56	96	130	74	150	210	230	180	250	290	300
46.1	Hard fragment (>= 2.5 cm)	1140	7.0	39.9	5.7	310	590	760	820	660	910	1000	1100	980	1100	N/A	N/A
117.2	Soft fragment (< 2.5 cm)	197	0.1	0.1	2.6	1	110	140	150	1	170	180	190	180	190	N/A	N/A
46.2	Soft fragment (>= 2.5 cm)	2045	2.0	6.7	3.3	81	310	560	690	410	880	1300	1400	1100	1600	1800	1900
48	Other	73	129.5	351.8	2.7	41	58	63	65	62	67	70	72	69	71	73	73
1172	Foam fragment (< 2.5 cm)	1127	0.2	0.2	1.0	12	33	65	89	45	130	230	300	170	370	560	670
462	Foam fragment (>=2.5 cm)	2399	2.3	21.5	9.3	1	1400	1500	1600	1800	2100	2300	N/A	1800	2200	2300	N/A
6.1	Foam food packaging	53	1.0	2.0	2.1	1	39	43	46	44	49	51	52	47	50	52	53
47.1	Soft fragment (>50 cm)	69	36.0	72.0	2.0	36	48	54	57	53	61	66	68	60	65	67	68
47.2	Hard fragment (>50 cm)	19	103.8	302.9	2.9	1	17	19	19	15	17	19	19	16	17	19	19
22.1	Straw	78	0.9	2.1	2.3	39	57	64	67	63	71	75	77	71	75	77	78
19	Food wrapping	882	1.5	11.2	7.4	500	620	690	730	670	780	850	870	730	810	850	870
39.1	Cable tie	41	4.3	9.8	2.3	17	27	32	34	30	37	38	39	38	40	41	41
39	Lollipop stick	110	2.2	3.3	1.5	4	14	26	34	20	42	60	70	50	78	92	97
19.1	Garbage bag	82	0.3	0.2	0.7	30	51	63	67	57	72	76	77	75	79	80	81
2.1	Pen	10	12.6	24.8	2.0	2	4	6	7	5	8	9	9	8	9	10	10
35.1	Fishing wire	85	1.2	2.7	2.2	37	58	67	71	65	76	80	81	77	81	83	85
39.1	Tape	25	4.3	9.8	2.3	19	22	24	25	20	23	24	25	23	24	25	25
49	Balloon	23	2.4	1.7	0.7	5	10	14	16	12	18	20	21	19	22	22	22
53	Other rubber	34	34.8	59.3	1.7	18	26	29	30	27	32	33	34	33	34	34	34
54	Clothing	31	151.2	178.9	1.2	12	19	24	25	22	27	29	29	29	31	31	31
59	Other textile	102	172.4	665.9	3.9	1	84	91	94	89	96	100	N/A	91	97	100	N/A
61	Cartboard	11	20.0	20.8	1.0	7	9	10	10	11	11	11	11	11	11	11	11
64	Cigarette filter	1308	0.5	0.1	0.2	1	1	3	7	1	1	11	19	1	1	47	67
67	Other paper	75	7.4	10.5	1.4	19	36	49	54	42	59	66	68	64	70	73	73
62.1	Drink carton	11	35.7	32.0	0.9	6	8	10	10	10	10	11	11	11	11	11	11
67	Undefinable paper	85	7.4	10.5	1.4	10	22	36	43	29	50	64	68	57	72	78	81
68	Cork	34	7.9	5.6	0.7	4	12	17	19	16	24	28	29	26	30	33	34
74	Other wood (< 50 cm)	38	225.4	529.6	2.3	26	32	34	35	34	36	38	38	35	37	38	38
81	Aluminium foil	98	4.3	11.1	2.6	54	71	81	84	77	87	94	96	86	92	95	96
78	Drink can	172	38.1	69.2	1.8	33	69	98	120	82	130	150	160	140	160	170	170
83	Old iron scrap	18	699.8	1101.0	1.6	14	16	18	18	14	16	18	18	16	17	18	18
77	Metal bottle cap	616	2.0	0.8	0.4	2	3	8	17	4	14	38	54	19	69	130	170
89	Other metal (< 50 cm)	159	125.1	526.5	4.2	1	130	140	150	1	150	N/A	N/A	1	N/A	N/A	N/A
90	Other metal (>= 50 cm)	12	927.8	1059.5	1.1	7	10	10	11	12	12	12	12	12	12	12	12
91	Glass bottles and ceramics	452	35.6	80.5	2.3	53	130	200	240	160	280	350	370	310	390	420	430
93	Other glass	73	14.7	55.7	3.8	1	63	67	68	64	69	72	73	64	69	72	73
7	Cosmetics	19	17.0	16.7	1.0	8	12	15	16	14	17	18	18	18	19	19	19
98	Cotton swab	215	0.2	18.7	0.1	1	1	1	1	1	1	1	1	1	1	1	N/A
102.2	Wet tissue	209	8.7	12.5	1.4	18	53	85	100	69	130	160	170	140	180	200	200
99	Sanitary towel	31	3.9	3.7	0.9	9	16	21	23	18	25	28	29	27	30	30	31
100	Tampon (applicator)	12	0.4	1.0	2.6	1	1	12	12	1	11	12	12	10	11	12	12
102	Other sanitary	13	10.9	15.0	1.4	9	12	13	13	11	12	13	13	13	13	13	13
105	Other medical	22	2.5	3.1	1.2	1	16	18	18	1	20	21	22	1	20	21	22
0	nurtles	140	0.0	0.0	0.9	4	22	38	48	26	57	83	94	70	110	120	130