

Supplementary Material

1 Supplementary Figures and Tables

1.1 Supplementary Figures



Figure S1. Custom made stainless steel quartering cross for dividing samples. The quartering cross is inserted in a glass jar from Weck (850 ml, J. Weck GmbH u. Co. KG, Germany) after good homogenisation and the sample divided after freezing at -20°C .

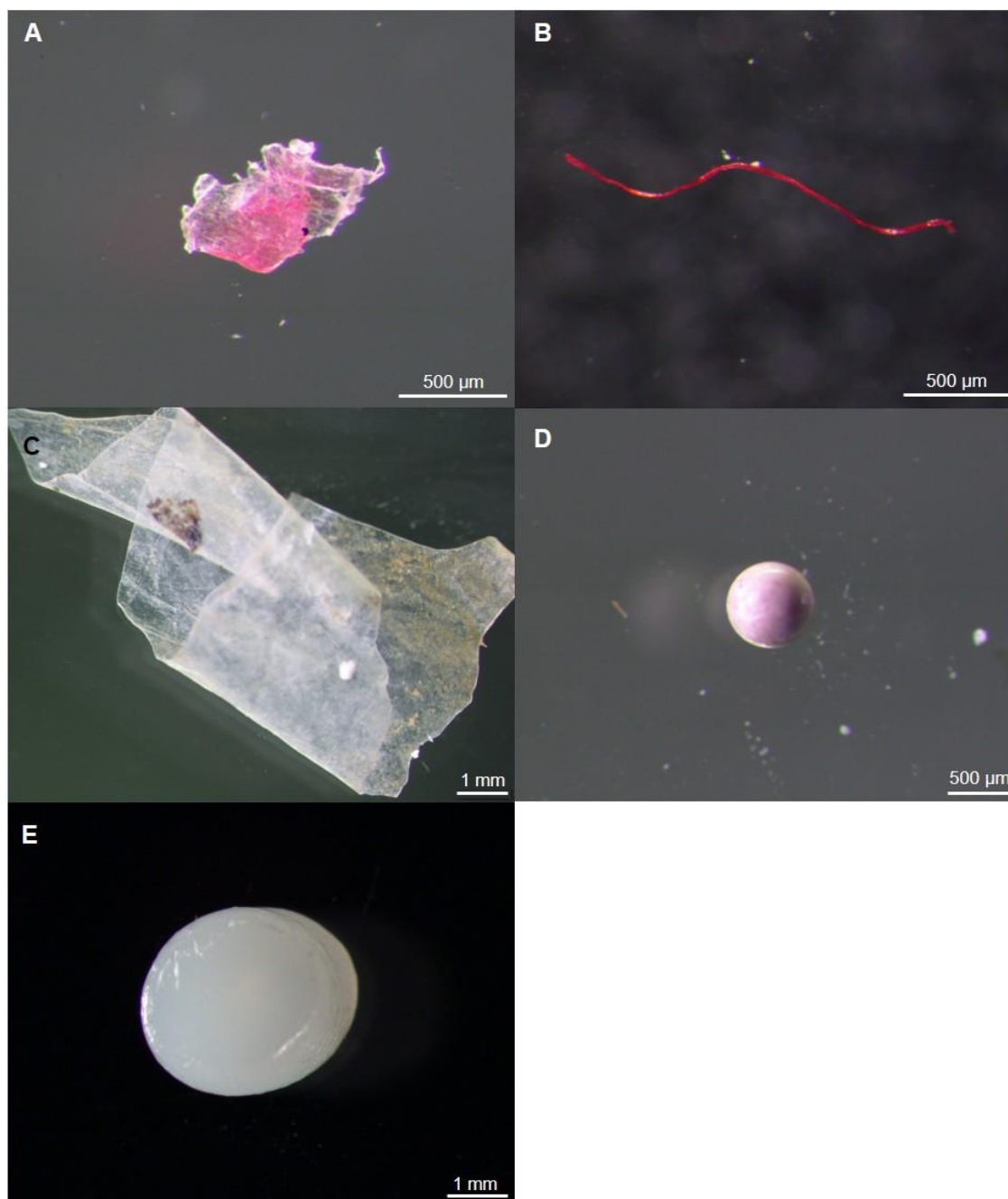


Figure S2. Examples for the five shape categories: A) fragment: irregular shaped particle, B) fiber: thin thread shaped abrasion from clothing or other tissue, C) film: thin mostly irregular shaped sheet, D) spherical beads, E) pellet: industrial raw material.

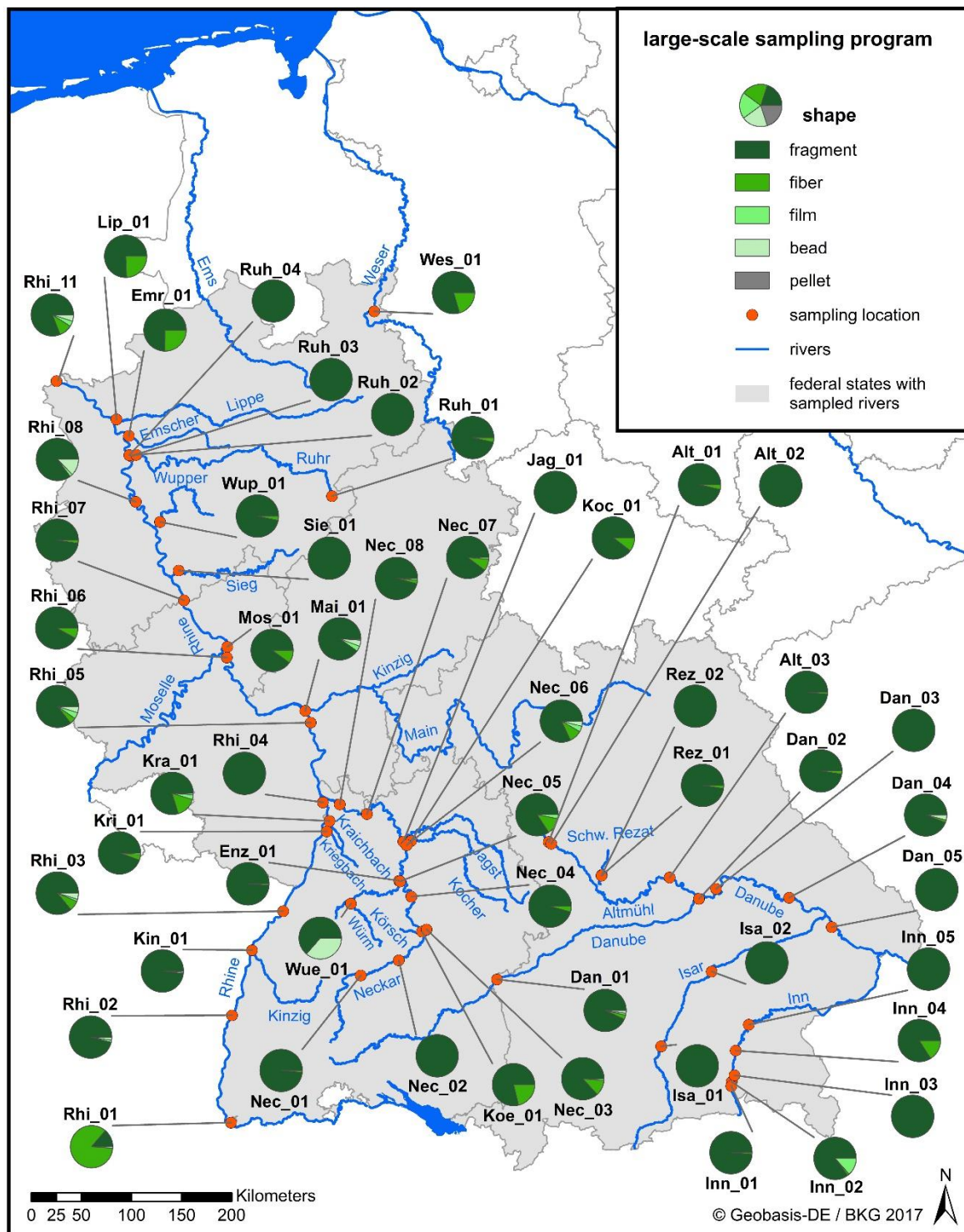


Figure S3. The ratio of the five different particle shape categories (fragment, fibre, film, bead, pellet) of the large-scale sampling program sample locations.

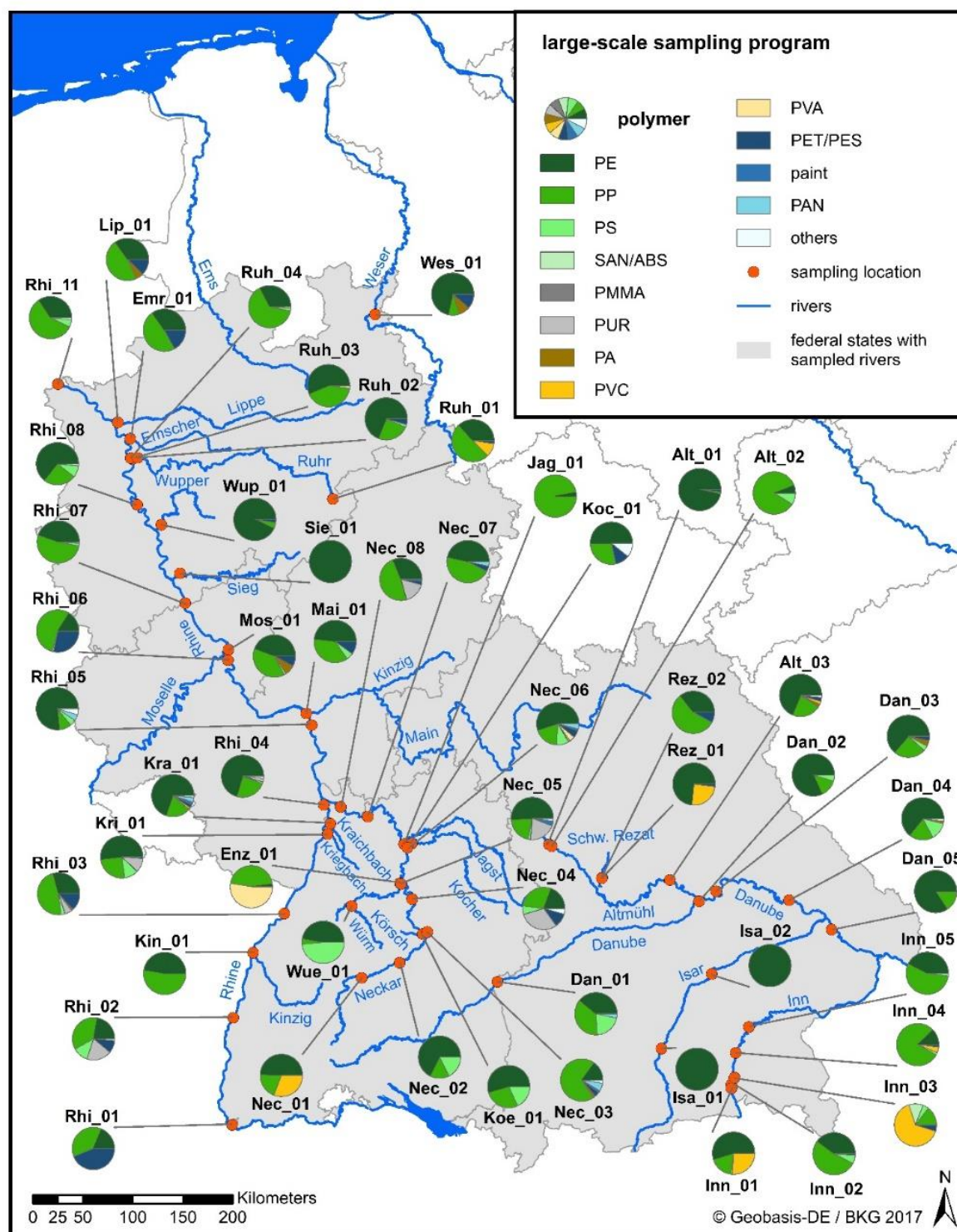


Figure S4. The ratio of the different polymer types of all large-scale sampling program sample locations. PE: polyethylene, PP: polypropylene, PS: polystyrene, SAN/ABS: styrene-acrylonitrile/acrylonitrile-butadiene-styrene, PMMA: polymethyl methacrylate, PUR: polyurethane, PA: polyamide, PVC: polyvinylchloride, PVA: polyvinyl alcohol, PET/PES: polyethylene terephthalate/polyester, PAN: polyacrylonitrile.

Supplementary Tables

Table S1. Large-scale sampling survey: location information including sample name, river, German federal state (BA: Bavaria, BW: Baden-Württemberg, RP: Rhineland-Palatinate, HE: Hesse, NW: North-Rhine Westphalia), sampling date and coordinates (WGS1984) are shown. Furthermore, particle concentrations (number of particles/m³) per size class and the ratio of the different particle shapes (%) are specified.

large-scale sampling					coordinates (WGS1984)		number of particles / m ³						ratio of shapes (%)				
sample name	river	German state	date	water volume [m ³]	X	Y	Macro-plastic (> 5mm)	large MP (5 - 1mm)	small MP I (1mm - 300µm)	small MP II (300 - 20µm)	Total MP (5 mm – 20 µm)	total (>20µm)	fiber	frag-ment	pellet	bead	film
Dan_01	Danube	BW	09.04.2015	36,2	10,02263096	48,42099	0.11	1.55	7.62	0.50	9.67	9.78	3.35	93.02	0.00	2.23	1.40
Dan_02	Danube	BA	06.11.2014	41,9	11,83461101	48,898963	0.00	0.10	0.10	37.50	37.69	37.69	2.53	97.47	0.00	0.00	0.00
Dan_03	Danube	BA	06.11.2014	41,3	11,98796396	48,95756	0.00	0.00	0.00	44.41	44.41	44.41	0.00	100.00	0.00	0.00	0.00
Dan_04	Danube	BA	19.08.2014	72,9	12,64417302	48,905462	0.01	0.22	0.12	0.37	0.71	0.73	1.96	94.12	0.00	3.92	0.00
Dan_05	Danube	BA	19.08.2014	66,2	13,02553704	48,730999	0.00	0.30	0.30	150.24	150.84	150.84	0.04	99.96	0.00	0.00	0.00
Nec_01	Neckar	BW	25.04.2015	26,7	8,800090531	48,4444467	0.00	0.00	0.15	9.60	9.75	9.75	1.54	98.46	0.00	0.00	0.00
Nec_02	Neckar	BW	25.04.2015	26,8	9,141534017	48,533974	0.00	0.30	0.60	33.34	34.23	34.23	0.00	100.00	0.00	0.00	0.00
Nec_03	Neckar	BW	03.03.2015	28,4	9,390087035	48,717449	0.49	10.30	24.55	23.98	58.83	59.32	11.95	86.38	0.00	0.48	1.19
Nec_04	Neckar	BW	04.03.2015	23,0	9,254316967	48,911783	0.04	1.04	3.99	2.95	7.98	8.03	4.32	95.14	0.00	0.00	0.54
Nec_05	Neckar	BW	04.03.2015	26,8	9,15364	49,001726	0.11	3.62	4.62	0.00	8.24	8.35	12.50	84.38	0.00	0.00	3.13
Nec_06	Neckar	BW	04.03.2015	25,7	9,211280001	49,214823	0.23	6.69	4.51	0.00	11.20	11.43	9.52	81.97	0.00	4.08	4.42
Nec_07	Neckar	BW	05.03.2015	34,3	8,855185993	49,396606	0.50	5.64	26.76	11.30	43.69	44.19	8.86	89.55	0.07	0.13	1.39
Nec_08	Neckar	BW	05.03.2015	38,6	8,61152499	49,453203	0.13	2.49	6.84	6.12	15.45	15.58	2.66	95.84	0.00	0.00	1.50
Rhi_01	Rhine	BW	24.03.2015	38,4	7,635656968	47,560593	0.00	0.94	7.71	1.35	10.00	10.00	85.11	13.83	0.00	1.06	0.00

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Rhi_02	Rhine	BW	24.03.2015	25,3	7,644506833	48,2065898	0.04	2.21	1.58	16.92	20.72	20.76	0.00	96.06	0.00	2.25	1.69
Rhi_03	Rhine	BW	25.03.2015	30,5	8,104485981	48,826134	0.16	4.32	6.52	1.41	12.25	12.41	7.58	86.01	0.00	4.66	1.75
Rhi_04	Rhine	BW	26.03.2015	36,2	8,460243037	49,464458	0.00	0.58	1.16	2.59	4.33	4.33	0.64	99.36	0.00	0.00	0.00
Rhi_05	Rhine	RP	01.09.2015	29,5	8,350209016	49,928114	0.00	1.49	0.68	0.72	2.89	2.89	4.76	85.71	0.00	4.76	4.76
Rhi_06	Rhine	RP	03.09.2015	46,0	7,598019289	50,3028747	0.09	3.13	6.44	12.61	22.18	22.26	7.84	90.59	0.00	0.78	0.78
Rhi_07	Rhine	NW	28.04.2015	70,1	7,213522028	50,629004	0.13	0.91	4.03	9.61	14.56	14.69	2.34	96.49	0.00	0.78	0.39
Rhi_08	Rhine	NW	28.04.2015	59,1	6,781896008	51,186706	0.10	1.78	3.54	1.69	7.01	7.11	0.96	84.39	0.00	12.49	2.16
Rhi_11	Rhine	NW	29.04.2015	52,4	6,069951989	51,86139	0.15	1.91	3.83	3.43	9.18	9.33	9.90	81.03	0.00	4.95	4.12
Ruh_01	Ruhr	NW	21.04.2015	26,8	8,542000037	51,218539	0.00	0.45	0.00	12.51	12.96	12.96	3.45	96.55	0.00	0.00	0.00
Ruh_02	Ruhr	NW	15.02.2017	51,5	6,785965195	51,450125	0.47	26.72	187.60	63.24	277.56	278.03	0.01	99.06	0.00	0.93	0.00
Ruh_03	Ruhr	NW	28.04.2015	38,5	6,739247041	51,443478	0.13	2.18	7.69	0.52	10.39	10.52	0.00	98.75	0.00	1.00	0.25
Ruh_04	Ruhr	NW	29.04.2015	39,6	6,723931041	51,448442	1.59	48.14	117.49	5.32	170.94	172.53	0.24	98.32	0.00	0.76	0.68
Alt_01	Altmühl	BA	18.09.2014	7,02	10,48581937	49,2333386	0.00	0.14	0.28	7.55	7.98	7.98	3.57	96.43	0.00	0.00	0.00
Alt_02	Altmühl	BA	18.09.2014	11,3	10,50932801	49,223226	0.00	0.00	0.00	71.60	71.60	71.60	0.00	100.00	0.00	0.00	0.00
Alt_03	Altmühl	BA	05.11.2014	40,0	11,57137097	49,024374	0.00	0.20	0.30	12.71	13,21	13.21	1.46	98.54	0.00	0.00	0.00
Inn_01	Inn	BA	09.07.2015	22,5	12,12516499	47,781571	0.18	4.45	4.23	43.42	52.10	52.28	1.27	98.73	0.00	0.00	0.00
Inn_02	Inn	BA	11.10.2016	8,0	12,12716248	47,8071367	4.14	27.51	15.70	49.74	92.94	97.09	1.45	85.15	0.00	0.00	13.40
Inn_03	Inn	BA	11.10.2016	15,5	12,15306021	47,8462923	0.26	0.32	0.00	78.92	79.25	79.50	0.16	99.34	0.00	0.00	0.49
Inn_04	Inn	BA	09.07.2015	10,6	12,16390423	47,9953793	0.00	1.32	6.12	39.53	46.97	46.97	0.81	99.19	0.00	0.00	0.00
Inn_05	Inn	BA	09.07.2015	25,7	12,28132596	48,150407	0.78	3.11	18.07	83.48	104.66	105.44	16.03	83.97	0.00	0.00	0.00
Isa_01	Isar	BA	20.08.2014	73,2	11,49595798	48,020971	0.00	0.10	0.10	8.08	8.27	8.27	0.33	99.67	0.00	0.00	0.00
Isa_02	Isar	BA	21.08.2014	74,9	11,94815956	48,4674737	0.05	0.05	0.05	87.70	87.81	87.86	0.00	99.94	0.00	0.00	0.06

Rez_01	Schwäbische Rezat	BA	12.05.2015	9,2	10,95957904	49,034957	0.87	8.26	1.74	344.03	354.03	354.90	2.47	97.53	0.00	0.00	0.00
Rez_02	Schwäbische Rezat	BA	12.05.2015	11,8	10,96299098	49,038402	0.00	0.34	6.80	61.56	68.70	68.70	0.00	100.00	0.00	0.00	0.00
Wue_01	Würm	BW	24.04.2015	25,7	8,71083797	48,870584	0.00	3.90	2.03	4.68	10.60	10.60	0.00	63.77	0.00	36.23	0.00
Enz_01	Enz	BW	24.04.2015	23,4	9,145234963	49,005055	0.00	0.17	0.17	15.91	16.25	16.25	1.16	98.84	0.00	0.00	0.00
Jag_01	Jagst	BW	23.04.2015	27,1	9,182307031	49,235783	0.00	0.00	0.15	4.88	5.02	5.02	0.00	100.00	0.00	0.00	0.00
Kin_01	Kinzig	BW	24.04.2015	9,8	7,823905041	48,594082	0.00	0.82	5.47	34.87	41.17	41.17	0.00	97.99	0.00	1.01	1.01
Koc_01	Kocher	BW	23.04.2015	27,1	9,251495032	49,239446	0.00	0.15	2.61	19.95	22.71	22.71	10.33	89.67	0.00	0.00	0.00
Koe_01	Körsch	BW	24.04.2015	25,0	9,349202961	48,705227	0.00	0.32	1.28	3.68	5.28	5.28	21.21	78.79	0.00	0.00	0.00
Kra_01	Kraichbach	BW	26.03.2015	18,7	8,519132026	49,355641	0.21	6.64	22.07	13.93	42.64	42.86	15.66	79.80	0.00	1.01	3.54
Kri_01	Kriegbach	BW	26.03.2015	15,8	8,494760972	49,294434	0.00	6.84	7.77	25.01	39.63	39.63	4.42	94.32	0.00	0.00	1.26
Mai_01	Main	HE	01.09.2015	22,6	8,302056994	49,996177	1.15	14.79	29.38	15.02	59.19	60.34	0.29	89.80	1.17	4.62	4.11
Mos_01	Moselle	RP	03.09.2015	24,0	7,602498997	50,363722	0.04	4.16	0.50	30.78	35.44	35.48	9.89	89.16	0.00	0.47	0.47
Emr_01	Emscher	NW	21.04.2015	19,0	6,720312992	51,557211	1.37	29.92	88.06	94.80	212.78	214.15	24.89	74.12	0.00	0.59	0.40
Lip_01	Lippe	NW	29.04.2015	25,7	6,607805975	51,648401	0.00	3.26	15.38	31.85	50.50	50.50	24.38	75.62	0.00	0.00	0.00
Sie_01	Sieg	NW	21.04.2015	16,5	7,166356975	50,798767	0.00	0.00	0.00	27.17	27.17	27.17	0.00	100.00	0.00	0.00	0.00
Wes_01	Weser	NW	22.04.2015	26,7	8,921019975	52,245909	0.04	1.50	3.45	0.30	5.24	5.28	20.44	79.56	0.00	0.00	0.00
Wup_01	Wupper	NW	21.04.2015	20,2	6,99960337	51,0738391	0.00	1.39	16.83	36.64	54.85	54.85	3.26	96.38	0.00	0.00	0.36

Table S2. Large-scale sampling survey: location information including sample name, river, German federal state (BA: Bavaria, BW: Baden-Württemberg, RP: Rhineland-Palatinate, HE: Hesse, NW: North Rhine-Westphalia) and date are shown. Furthermore, the ratio of the different polymer types (%) is specified.

large-scale sampling				ratio of polymer types (%)												
sample name	river	German state	date	PE	PP	PS	SAN/ABS	PMMA	PUR	PA	PVC	PVA	PET/PES	paint	PAN	others
Dan_01	Danube	BW	09.04.2015	38.98	37.01	20.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.39	0.00
Dan_02	Danube	BA	06.11.2014	81.52	13.42	4.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25
Dan_03	Danube	BA	06.11.2014	63.76	24.67	3.93	0.00	0.00	0.00	4.15	0.00	0.00	3.49	0.00	0.00	0.00
Dan_04	Danube	BA	19.08.2014	64.15	18.87	13.21	0.00	0.00	0.00	1.89	0.00	0.00	0.00	0.00	0.00	1.89
Dan_05	Danube	BA	19.08.2014	84.09	15.83	0.04	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
Nec_01	Neckar	BW	25.04.2015	49.23	20.00	0.00	0.00	0.00	0.00	0.00	30.77	0.00	0.00	0.00	0.00	0.00
Nec_02	Neckar	BW	25.04.2015	67.25	14.85	17.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44
Nec_03	Neckar	BW	03.03.2015	14.74	68.55	0.54	0.48	0.00	0.00	1.90	0.00	0.00	3.80	1.43	6.18	2.38
Nec_04	Neckar	BW	04.03.2015	19.46	28.65	6.49	0.00	0.00	30.27	0.00	0.00	0.00	10.81	0.00	0.00	4.32
Nec_05	Neckar	BW	04.03.2015	50.89	20.98	1.79	0.00	0.00	20.54	0.00	0.00	0.00	0.00	3.57	0.00	2.23
Nec_06	Neckar	BW	04.03.2015	54.76	19.05	9.52	0.00	0.00	1.36	0.34	0.00	4.08	5.44	1.36	4.08	0.00
Nec_07	Neckar	BW	05.03.2015	45.20	44.49	0.86	0.00	0.00	0.13	0.46	0.07	0.46	3.96	0.59	3.50	0.26
Nec_08	Neckar	BW	05.03.2015	30.12	46.59	0.67	0.67	0.00	15.97	0.67	0.00	0.67	2.66	1.33	0.00	0.67
Rhi_01	Rhine	BW	24.03.2015	18.75	37.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.75	0.00	0.00	0.00
Rhi_02	Rhine	BW	24.03.2015	22.29	35.81	11.81	0.00	0.00	19.05	0.00	0.00	0.00	9.52	0.00	0.00	1.52
Rhi_03	Rhine	BW	25.03.2015	29.29	47.49	3.17	0.00	0.00	5.54	1.32	0.00	0.00	13.19	0.00	0.00	0.00
Rhi_04	Rhine	BW	26.03.2015	70.06	23.57	1.27	0.00	0.00	2.55	0.00	0.00	0.00	0.00	0.00	0.64	1.91
Rhi_05	Rhine	RP	01.09.2015	76.56	9.38	4.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.69	4.69

Rhi_06	Rhine	RP	03.09.2015	43.75	37.89	1.56	0.00	0.00	0.39	7.81	0.00	0.39	7.81	0.00	0.00	0.39
Rhi_07	Rhine	NW	28.04.2015	44.28	51.83	1.94	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.00	1.17	0.00
Rhi_08	Rhine	NW	28.04.2015	63.68	24.90	8.56	1.90	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rhi_11	Rhine	NW	29.04.2015	34.36	58.28	5.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.64
Ruh_01	Ruhr	NW	21.04.2015	36.78	50.57	0.00	0.00	0.00	0.00	0.00	10.34	0.00	2.30	0.00	0.00	0.00
Ruh_02	Ruhr	NW	15.02.2017	68.89	24.55	2.01	0.00	0.00	0.00	0.00	0.00	0.01	4.53	0.00	0.01	0.00
Ruh_03	Ruhr	NW	28.04.2015	56.30	41.73	0.00	0.00	0.00	0.00	0.00	0.00	1.98	0.00	0.00	0.00	0.00
Ruh_04	Ruhr	NW	29.04.2015	31.92	63.03	1.87	0.18	0.00	0.18	0.48	0.00	1.29	0.06	0.07	0.06	0.87
Alt_01	Altmühl	BA	18.09.2014	96.43	1.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.79	0.00	0.00	0.00
Alt_02	Altmühl	BA	18.09.2014	5.91	85.22	8.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Alt_03	Altmühl	BA	05.11.2014	68.18	21.97	0.76	0.00	0.00	0.00	2.27	2.27	0.00	3.03	0.00	0.00	1.52
Inn_01	Inn	BA	09.07.2015	39.35	52.21	6.39	0.00	0.00	0.09	0.34	0.17	0.00	1.11	0.09	0.26	0.00
Inn_02	Inn	BA	11.10.2016	54.59	18.24	1.03	0.00	0.00	0.00	0.13	25.87	0.00	0.00	0.00	0.00	0.13
Inn_03	Inn	BA	11.10.2016	0.41	14.45	4.52	10.83	0.00	0.00	0.08	64.95	0.00	4.76	0.00	0.00	0.00
Inn_04	Inn	BA	09.07.2015	42.08	54.91	2.20	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.20	0.00
Inn_05	Inn	BA	09.07.2015	12.26	79.17	1.77	0.00	0.00	0.15	0.44	4.28	0.00	1.92	0.00	0.00	0.00
Isa_01	Isar	BA	20.08.2014	99.50	0.17	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.17	0.00	0.00	0.00
Isa_02	Isar	BA	21.08.2014	99.82	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rez_01	Schwäbische Rezat	BA	12.05.2015	72.92	0.25	0.00	0.00	0.00	0.00	0.00	24.51	0.00	1.96	0.12	0.25	0.00
Rez_02	Schwäbische Rezat	BA	12.05.2015	35.64	56.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.92	0.00	0.00	0.00
Wue_01	Würm	BW	24.04.2015	47.06	4.41	48.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Enz_01	Enz	BW	24.04.2015	2.11	45.26	0.00	0.00	0.00	0.00	0.00	0.00	52.63	0.00	0.00	0.00	0.00

Jag_01	Jagst	BW	23.04.2015	2.94	97.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kin_01	Kinzig	BW	24.04.2015	46.84	52.16	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
Koc_01	Kocher	BW	23.04.2015	50.33	27.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.85	0.00	0.00	10.85
Koe_01	Körsch	BW	24.04.2015	54.55	27.27	18.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kra_01	Kraichbach	BW	26.03.2015	68.00	18.50	1.00	0.50	0.00	0.50	0.50	1.50	0.00	2.50	2.00	3.50	1.50
Kri_01	Kriegbach	BW	26.03.2015	51.60	25.16	10.66	0.00	0.00	10.66	0.00	0.00	0.00	1.28	0.00	0.00	0.64
Mai_01	Main	HE	01.09.2015	46.99	35.64	5.34	0.59	0.00	0.29	0.29	0.00	0.59	9.76	0.00	0.29	0.22
Mos_01	Moselle	RP	03.09.2015	15.94	54.40	1.06	0.00	0.00	0.00	0.00	0.00	0.00	28.14	0.47	0.00	0.00
Emr_01	Emscher	NW	21.04.2015	34.06	47.05	0.79	0.00	0.00	0.00	0.20	0.00	0.39	16.72	0.00	0.20	0.59
Lip_01	Lippe	NW	29.04.2015	34.77	47.08	0.00	0.00	0.00	0.00	5.85	0.00	0.00	12.31	0.00	0.00	0.00
Sie_01	Sieg	NW	21.04.2015	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wes_01	Weser	NW	22.04.2015	71.63	8.51	0.00	0.00	0.00	0.00	8.51	0.00	0.00	11.35	0.00	0.00	0.00
Wup_01	Wupper	NW	21.04.2015	92.06	4.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.53	0.00	0.72	0.00

Table S3. Repeated sampling survey: location information about including sample name, river, German federal state (BA: Bavaria, BW: Baden-Württemberg, RP: Rhineland-Palatinate, HE: Hesse, NW: North-Rhine Westphalia), location, date and coordinates (WGS1984) are shown. Furthermore, particle concentrations (number of particles/m³) per size class and the ratio of the different particle shapes (%) are specified.

repeated sampling						coordinates (WGS1984)		number of particles / m ³						ratio of shapes (%)				
sample name	river	state	location	date	water volume [m ³]	X	Y	Macro-plastic (> 5mm)	Large MP (5 - 1mm)	Small MP I (1mm - 300µm)	Total MP (5 mm – 20 µm)	Small MP II (300 - 20µm)	total (>5mm - 20µm)	fiber	frag-ment	pellet	bead	film
Rez_01_1 (0h)	Schwäbische Rezat	BA	upstream WWTP	12.05.2015	14,19	10,959579	49,034957	2.12	17.56	12.41	51.87	277.29	309.38	6.26	93.64	0.00	0.00	0.10
Rez_01_2 (0.5h)	Schwäbische Rezat	BA	upstream WWTP	12.05.2015	11,09	10,959579	49,034957	0.00	2.22	19.00	117.80	334.42	355.64	1.60	98.31	0.00	0.00	0.09
Rez_01_3 (1h)	Schwäbische Rezat	BA	upstream WWTP	12.05.2015	14,30	10,959579	49,034957	2.65	2.41	24.08	35.94	139.68	168.82	3.18	96.82	0.00	0.00	0.00
Rez_02_1 (0h)	Schwäbische Rezat	BA	downstream WWTP	12.05.2015	3,30	10,962991	49,038402	0.14	0.49	19.80	307.26	31.57	52.01	15.87	84.00	0.00	0.00	0.13
Rez_02_2 (0.5h)	Schwäbische Rezat	BA	downstream WWTP	12.05.2015	3,16	10,962991	49,038402	0.27	5.05	33.89	355.64	78.87	118.07	16.27	83.35	0.00	0.38	0.00
Rez_02_3 (1h)	Schwäbische Rezat	BA	downstream WWTP	12.05.2015	4,15	10,962991	49,038402	0.00	0.35	5.66	166.17	29.93	35.94	7.57	92.43	0.00	0.00	0.00
Rhi_09 (0h)	Rhine	NW	upstream river Ruhr	15.02.2017	45,4	6,72019676	51,450528	0.04	3.35	29.49	50.64	17.81	50.69	0.18	75.35	0.00	24.47	0.00
Rhi_09 (5h)	Rhine	NW	upstream river Ruhr	15.02.2017	44,4	6,72019676	51,450528	0.05	4.05	76.52	136.51	55.94	136.55	16.24	56.92	0.00	26.84	0.00
Rhi_09 (22)	Rhine	NW	upstream river Ruhr	16.02.2017	35,4	6,72019676	51,450528	0.08	1.39	48.76	105.01	54.87	105.10	5.94	74.76	0.00	19.30	0.00

Supplementary Material

Rhi_09 (141d)	Rhine	NW	upstream river Ruhr	06.07.2017	26,7	6,72019676	51,450528	0.04	0.97	126.09	225.29	98.23	225.33	1.99	46.60	0.00	51.40	0.00
Rhi_10 (0h)	Rhine	NW	downstream river Ruhr	15.02.2017	31,4	6,72266928	51,4613093	0.03	8.64	73.58	165.20	82.98	165.23	9.84	87.63	0.00	2.53	0.00
Rhi_10 (5h)	Rhine	NW	downstream river Ruhr	15.02.2017	50,5	6,72266928	51,4613093	0.16	4.00	13.52	26.56	9.04	26.71	0.62	78.78	0.00	20.45	0.15
Rhi_10 (22h)	Rhine	NW	downstream river Ruhr	16.02.2017	29,9	6,72266928	51,4613093	0.07	19.35	87.80	193.50	86.36	193.57	6.46	79.51	0.00	14.03	0.00
Rhi_10 (141d)	Rhine	NW	downstream river Ruhr	06.07.2017	37,9	6,72266928	51,4613093	0.05	1.11	56.74	124.91	67.06	124.97	0.00	62.74	0.00	37.26	0.00
Ruh_04 (0h)	Ruhr	NW	downstream WWTP	15.02.2017	42,2	6,72393104	51,448442	0.02	0.21	57.72	62.01	4.07	62.03	0.00	100.00	0.00	0.00	0.00
Ruh_04 (5h)	Ruhr	NW	downstream WWTP	15.02.2017	29,4	6,72393104	51,448442	0.17	8.74	174.47	265.37	82.15	265.54	7.56	92.40	0.00	0.04	0.00
Ruh_04 (22h)	Ruhr	NW	downstream WWTP	16.02.2017	37,2	6,72393104	51,448442	0.13	4.62	72.19	106.37	29.55	106.50	12.58	80.91	0.00	6.52	0.00
Ruh_04 (141d)	Ruhr	NW	downstream WWTP	6.07.2017	40,9	6,72393104	51,448442	0.54	34.72	520.85	754.86	199.29	755.40	6.64	81.71	0.00	11.65	0.00

Table S4. Repeated sampling survey: information about locations including sample name, river, German federal state (BA: Bavaria, BW: Baden-Württemberg, RP: Rhineland-Palatinate, HE: Hesse, NW: North Rhine-Westphalia) and date are shown. Furthermore, the ratio of the different polymer types (%) is specified.

repeated sampling					ratio of polymer types (%)												
sample name	river	German state	location	date	PE	PP	PS	SAN/ABS	PMM A	PUR	PA	PVC	PVA	PET/PES	paint	PAN	other s
Rez_01_1 (0h)	Schwäbische Rezat	BA	upstream WWTP	12.05.2015	0.00	22.11	2.94	0.00	0.00	0.00	0.00	70.45	0.00	3.91	0.00	0.59	0.00
Rez_01_2 (0.5h)	Schwäbische Rezat	BA	upstream WWTP	12.05.2015	1.16	7.66	0.36	0.00	0.00	0.00	0.00	89.85	0.00	0.98	0.00	0.00	0.00
Rez_01_3 (1h)	Schwäbische Rezat	BA	upstream WWTP	12.05.2015	2.85	0.57	0.00	0.00	0.00	0.00	0.43	94.15	0.00	1.85	0.00	0.14	0.00
Rez_02_1 (0h)	Schwäbische Rezat	BA	downstream WWTP	12.05.2015	30.49	29.13	4.47	0.00	0.00	5.42	9.76	0.00	0.00	20.73	0.00	0.00	0.00
Rez_02_2 (0.5h)	Schwäbische Rezat	BA	downstream WWTP	12.05.2015	29.00	29.26	1.53	0.00	0.00	0.00	9.57	15.28	0.00	15.36	0.00	0.00	0.00
Rez_02_3 (1h)	Schwäbische Rezat	BA	downstream WWTP	12.05.2015	27.43	19.07	0.58	0.00	0.00	0.00	0.00	15.56	0.00	29.57	0.00	0.00	7.78
Rhi_09 (0h)	Rhine	NW	upstream river Ruhr	15.02.2017	23.39	32.61	29.78	5.57	5.57	0.00	0.04	0.00	0.00	3.00	0.00	0.04	0.00
Rhi_09 (5h)	Rhine	NW	upstream river Ruhr	15.02.2017	21.32	22.66	26.72	6.41	2.11	0.00	0.02	0.00	0.03	20.70	0.00	0.02	0.02
Rhi_09 (22)	Rhine	NW	upstream river Ruhr	16.02.2017	47.82	12.86	26.08	3.44	0.16	0.00	0.00	0.00	0.00	9.53	0.00	0.11	0.00
Rhi_09 (141d)	Rhine	NW	upstream river Ruhr	06.07.2017	11.00	27.61	53.51	0.00	4.29	0.00	0.00	0.00	0.00	3.59	0.00	0.00	0.00

Rhi_10 (0h)	Rhine	NW	downstream river Ruhr	15.02.2017	29.24	43.55	10.24	7.41	0.00	0.00	4.96	0.02	0.00	4.57	0.00	0.00	0.02
Rhi_10 (5h)	Rhine	NW	downstream river Ruhr	15.02.2017	40.58	29.01	19.66	0.74	0.15	0.00	0.00	9.50	0.00	0.07	0.00	0.22	0.07
Rhi_10 (22h)	Rhine	NW	downstream river Ruhr	16.02.2017	41.86	15.06	13.99	15.82	2.25	0.00	2.21	0.00	0.00	8.72	0.00	0.07	0.02
Rhi_10 (141d)	Rhine	NW	downstream river Ruhr	06.07.2017	3.44	3.21	90.98	0.00	0.06	0.00	0.02	0.00	0.00	2.28	0.00	0.00	0.00
Ruh_04 (0h)	Ruhr	NW	downstream WWTP	15.02.2017	63.88	33.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60	0.00	0.00	0.00
Ruh_04 (5h)	Ruhr	NW	downstream WWTP	15.02.2017	49.74	41.61	3.29	0.00	0.00	0.00	0.01	0.00	0.00	5.30	0.00	0.05	0.00
Ruh_04 (22h)	Ruhr	NW	downstream WWTP	16.02.2017	51.03	31.74	6.28	0.03	0.00	0.00	0.00	0.00	0.00	10.92	0.00	0.00	0.00
Ruh_04 (141d)	Ruhr	NW	downstream WWTP	06.07.2017	49.29	29.99	11.63	0.00	4.16	0.00	0.00	0.00	0.00	4.10	0.00	0.82	0.00