**Supporting Information**

**Quantifying Ecological Risks of Aquatic Micro- and Nanoplastic**

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**Table A1.** Microplastic effect thresholds extrapolated to chronic LOECs. Exposure via the water. Species from the marine, estuarine and freshwater environments. Included endpoints are growth, survival and reproduction. Abbreviations used: LOEC: lowest observed effect concentration, LC50: lethal dose 50%, EC50: effect concentration 50%. PE: polyethylene, PVC: polyvinylchloride, PS: polystyrene, PMMA: polymethylmethacrylate, PHB: polyhydroxybutyrate, PP: polypropylene (Au, Bruce, Bridges, & Klaine, 2015; Cole, Lindeque, Fileman, Halsband, & Galloway, 2015; Jeong et al., 2016; Kalčíková, Žgajnar Gotvajn, Kladnik, & Jemec, 2017; Kaposi, Mos, Kelaher, & Dworjanyn, 2014; Lee et al., 2013; Ogonowski, Schür, Jarsén, & Gorokhova, 2016; Straub, Hirsch, & Burkhardt-Holm, 2017; Sussarellu et al., 2016; C. Zhang, Chen, Wang, & Tan, 2017).

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| **Taxonomic group** | **Species** | **Water type** | **Polymer type** | **Particle shape** | **Particle size range (µm)** | **Endpoint** | **Reported effect level** | **Exposure duration (d)** | **Extrapolation factor** | **Reported effect threshold** | **Chronic LOEC after extrapolation (ng/L)** | **Reference** |
| Angiospermae | *Lemna minor* | Fresh | PE | Sphere | 30 - 600 | Growth | LOEC | 7 | 6.5 | 10 mg/L | 1.54E+06 | Kalčíková et al., 2017 |
| Diatomea | *Skeletonema costatum* | Marine | PVC | Sphere | 1 | Growth | LOEC | 3 | 10 | 1 mg/L | 1.00E+05 | Zhang et al., 2017 |
| Bivalvia | *Crassostrea gigas* | Marine | PS | Sphere | 2, 6 | Growth, reproduction | LOEC | 60 | 1 | 0.023 mg/L | 2.30E+04 | Sussarellu et al., 2016 |
| Amphipoda | *Gammarus fossarum* | Fresh | PMMA | Irregular | 32 - 250 | Growth | LOEC | 28 | 1 | 333.3 Particles/ml | 2.91E+08 | Straub et al., 2017 |
| Amphipoda | *Gammarus fossarum* | Fresh | PHB | Irregular | 32 - 250 | Growth | LOEC | 28 | 1 | 333.3 Particles/ml | 3.03E+08 | Straub et al., 2017 |
| Amphipoda | *Hyalella azteca* | Fresh/brackish | PE | Sphere | 10 - 27 | Survival | LC50 | 10 | 20 | 46000 Particles/ml | 8.62E+06 | Au et al., 2015 |
| Amphipoda | *Hyalella azteca* | Fresh/brackish | PP | Fibre | 20 x 75 | Survival | LC50 | 10 | 20 | 71 Particles/ml | 2.63E+05 | Au et al., 2015 |
| Amphipoda | *Hyalella azteca* | Fresh/brackish | PE | Sphere | 10 - 27 | Growth, reproduction | LOEC | 28 | 1 | 5000 Particles/ml | 1.87E+07 | Au et al., 2015 |
| Amphipoda | *Hyalella azteca* | Fresh/brackish | PE | Sphere | 10 - 27 | Growth, reproduction | LOEC | 28 | 1 | 10000 Particles/ml | 3.75E+07 | Au et al., 2015 |
| Amphipoda | *Hyalella azteca* | Fresh/brackish | PP | Fibre | 20 x 75 | Growth, reproduction | EC50 | 10 | 10 | 45 Particles/ml | 3.34E+05 | Au et al., 2015 |
| Cladocera | *Daphnia magna* | Fresh | PE | Irregular | 2.6 | Reproduction | EC50 | 21 | 5 | 86000 Particles/ml | 7.91E+04 | Ogonowski et al., 2016 |
| Copepoda | *Calanus helgolandicus* | Marine | PS | Sphere | 20 | Reproduction | LOEC | 9 | 10 | 75 Particles/ml | 3.30E+04 | Cole et al., 2015 |
| Copepoda | *Tigriopus japonicus* | Brackish | PS | Sphere | 0.5 | Survival | LC50 | 14 | 20 | 23.5 mg/L | 1.18E+06 | Lee et al., 2013 |
| Copepoda | *Tigriopus japonicus* | Brackish | PS | Sphere | 0.5 | Reproduction | EC50 | 14 | 10 | 0.07 mg/L | 7.00E+03 | Lee et al., 2013 |
| Copepoda | *Tigriopus japonicus* | Brackish | PS | Sphere | 6 | Reproduction | EC50 | 14 | 10 | 0.04 mg/L | 4.00E+03 | Lee et al., 2013 |
| Copepoda | *Tigriopus japonicus* | Brackish | PS | Sphere | 0.5 | Reproduction | EC50 | 14 | 10 | 0.1 mg/L | 1.00E+04 | Lee et al., 2013 |
| Echinodermata | *Tripneustes gratilla* | Marine | PE | Sphere | 10 - 45 | Growth | LOEC | 5 | 10 | 300 Particles/ml | 3.28E+05 | Kaposi et al., 2014 |
| Rotifera | *Brachionus koreanus* | Fresh/brackish | PS | Sphere | 0.5 | Growth | LOEC | 12 | 6.5 | 0.1 mg/L | 1.54E+04 | Jeong et al., 2016 |
| Rotifera | *Brachionus koreanus* | Fresh/brackish | PS | Sphere | 0.5 | Survival | LOEC | 12 | 6.5 | 20 mg/L | 3.08E+06 | Jeong et al., 2016 |
| Rotifera | *Brachionus koreanus* | Fresh/brackish | PS | Sphere | 6 | Growth | LOEC | 12 | 6.5 | 0.1 mg/L | 1.54E+04 | Jeong et al., 2016 |
| Rotifera | *Brachionus koreanus* | Fresh/brackish | PS | Sphere | 0.5 | Reproduction | LOEC | 12 | 6.5 | 20 mg/L | 3.08E+06 | Jeong et al., 2016 |

**Table A2.** Nanoplastic effect thresholds extrapolated to chronic LOECs. Exposure via the water. Species from the marine, estuarine and freshwater environments. Included endpoints are growth, survival and reproduction. Abbreviations used: LOEC: lowest observed effect concentration, LC50: lethal dose 50%, EC50: effect concentration 50%. PS: polystyrene, PEI: polyethyleneimine (Bergami et al., 2017; Elisa Bergami et al., 2016; E. Besseling et al., 2014b; Casado, Macken, & Byrne, 2013; C. Della Torre et al., 2014; Jeong et al., 2016; Lee et al., 2013; Nasser & Lynch, 2016; Sjollema, Redondo-Hasselerharm, Leslie, Kraak, & Vethaak, 2016; Tussellino et al., 2015)*.*

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|  .**Taxonomic group** | **Species** | **Water type** | **Polymer type** | **Particle shape** | **Particle size range (nm)** | **Endpoint** | **Reported effect level** | **Exposure duration (d)** | **Extrapolation factor** | **Reported effect threshold (mg/L)** | **Chronic LOEC after extrapolation (µg/L)** | **Reference** |
| Amphibia | *Xenopus laevis* | Fresh | PS | Sphere | 50 | Survival, growth | LOEC | 7 | 6.5 | 4.5 | 6.92E+02 | Tusselino et al., 2015 |
| Chlorophyceae | *Dunaliella tertiolecta* | Marine | PS | Sphere | 50 | Growth | LOEC | 3 | 10 | 250 | 2.50E+04 | Sjollema et al. , 2015 |
| Chlorophyceae | *Dunaliella tertiolecta* | Marine | PS | Sphere | 56 | Growth | EC50 | 3 | 15 | 12.97 | 8.65E+02 | Bergami et al., 2017 |
| Chlorophyceae | *Pseudokirchneriella subcapitata* | Fresh | PS, PEI | Sphere | 55 | Growth | EC50 | 3 | 15 | 0.58 | 3.87E+01 | Casado et al., 2012 |
| Chlorophyceae | *Pseudokirchneriella subcapitata* | Fresh | PS, PEI | Sphere | 100 | Growth | EC50 | 3 | 15 | 0.54 | 3.60E+01 | Casado et al., 2012 |
| Chlorophyceae | *Scenedesmus obliquus* | Fresh | PS | Sphere | 70 | Growth | LOEC | 3 | 10 | 1000 | 1.00E+05 | Besseling et al., 2014 |
| Anostraca | *Artemia franciscana* | Marine | PS | Sphere | 56 | Survival | LC50 | 14 | 20 | 0.83 | 4.15E+01 | Bergami et al., 2017 |
| Anostraca | *Artemia franciscana* | Marine | PS | Sphere | 50 | Growth | LOEC | 2 | 10 | 50 | 5.00E+03 | Bergami et al., 2016 |
| Anostraca | *Thamnocephalus platyurus* | Fresh | PS, PEI | Sphere | 55 | Survival | LC50 | 1 | 30 | 5.2 | 1.73E+02 | Casado et al., 2012 |
| Anostraca | *Thamnocephalus platyurus* | Fresh | PS, PEI | Sphere | 100 | Survival | LC50 | 1 | 30 | 4.03 | 1.34E+02 | Casado et al., 2012 |
| Cladocera | *Daphnia magna* | Fresh | PS | Sphere | 70 | Survival | LOEC | 21 | 1 | 32 | 3.20E+04 | Besseling et al., 2014 |
| Cladocera | *Daphnia magna* | Fresh | PS | Sphere | 85.51 - 89.09 | Survival | LC50 | 1 | 30 | 36.3 | 1.21E+03 | Nasser and Lynch, 2016 |
| Cladocera | *Daphnia magna* | Fresh | PS | Sphere | 85.51 - 89.09 | Survival | LC50 | 1 | 30 | 25.8 | 8.60E+02 | Nasser and Lynch, 2016 |
| Cladocera | *Daphnia magna* | Fresh | PS | Sphere | 70 | Growth | LOEC | 21 | 1 | 1 | 1.00E+03 | Besseling et al., 2014 |
| Cladocera | *Daphnia magna* | Fresh | PS | Sphere | 70 | Growth | LOEC | 21 | 1 | 100 | 1.00E+05 | Besseling et al., 2014 |
| Cladocera | *Daphnia magna* | Fresh | PS | Sphere | 70 | Reproduction | LOEC | 21 | 1 | 100 | 1.00E+05 | Besseling et al., 2014 |
| Copepoda | *Tigriopus japonicus* | Brackish | PS | Sphere | 50 | Survival | LC50 | 14 | 20 | 2.15 | 1.08E+02 | Lee et al., 2013 |
| Copepoda | *Tigriopus japonicus* | Brackish | PS | Sphere | 50 | Survival | LC50 | 14 | 20 | 0.16 | 8.00E+00 | Lee et al., 2013 |
| Echinodermata | *Paracentrotus lividus* | Marine | PS | Sphere | 40 | Survival | LOEC | 2 | 10 | 50 | 5.00E+03 | Della Torre et al., 2014 |
| Echinodermata | *Paracentrotus lividus* | Marine | PS | Sphere | 50 | Survival | LC50 | 1 | 30 | 3.85 | 1.28E+02 | Della Torre et al., 2014 |
| Echinodermata | *Paracentrotus lividus* | Marine | PS | Sphere | 50 | Survival | LC50 | 2 | 30 | 2.61 | 8.70E+01 | Della Torre et al., 2014 |
| Rotifera | *Brachionus koreanus* | Marine | PS | Sphere | 50 | Growth | LOEC | 12 | 6.5 | 0.1 | 1.54E+01 | Jeong et al., 2016 |
| Rotifera | *Brachionus koreanus* | Marine | PS | Sphere | 50 | Reproduction | LOEC | 12 | 6.5 | 1 | 1.54E+02 | Jeong et al., 2016 |
| Rotifera | *Brachionus koreanus* | Marine | PS | Sphere | 50 | Survival | LOEC | 12 | 6.5 | 0.1 | 1.54E+01 | Jeong et al., 2016 |

**Table A3**.Micro- and nanoplastic effect thresholds extrapolated to chronic LOECs. Exposure via the food or sediment. Species from the marine and freshwater environments. Included endpoints are growth and survival. Abbreviations used: LOEC: lowest observed effect concentration, PS: polystyrene, PE: polyethylene. Exposure concentrations of plastic particles in sediment are expressed for DW sediment. No conversions to DW were made for food, as the information on WW/DW food mass provided by the articles was often unclear (Besseling et al., 2013; Cedervall et al., 2012; Mazurais et al., 2015).

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| **Taxonomic group** | **Species** | **Water type** | **Polymer type** | **Particle shape** | **Particle size range** | **Endpoint** | **Reported effect level** | **Exposure duration (d)** | **Extrapolation factor** | **Effect threshold (g/kg DW)** | **Chronic LOEC after extrapolation (g/kg DW)** | **Exposure medium** | **Reference** |
| Annelida | *Arenicola marina* | Marine | PS | Sphere | 0.4 - 1.3 mm | Growth | LOEC | 28 | 1 | 74 | 74 | Sediment | Besseling et al., 2013 |
| Chordata | *Dicentrarchus labrax* | Marine | PE | Sphere | 10 - 45 µm | Survival | LOEC | 36 | 1 | 12 | 12 | Food | Mazurais et al., 2015 |
| Chordata | *Carassius carassius* | Fresh | PS | Sphere | 24 nm | Growth | LOEC | 30 | 1 | 1 | 1 | Food | Cedervall et al., 2012 |

**Table A4**.Microplastic effect thresholds extrapolated to chronic LOECs. Exposure via sediment (white rows) or food (grey rows). Species from the marine environment. Wide variety of endpoints included. Abbreviations used: LOEC: lowest observed effect concentration, (U)PVC: (unplasticised) polyvinylchloride, PS: polystyrene, (HD or LD)PE: (high or low density) polyethylene, PLA: polylactic acid (nylon). Exposure concentrations of plastic particles in sediment are expressed for DW sediment. No conversions to DW were made for food, as the information on WW/DW food mass provided by the articles was often unclear (Besseling et al., 2013; Espinosa, Cuesta, & Esteban, 2017; Farrell & Nelson, 2013; Nobre et al., 2015; Ped et al., 2016; Rochman, Kurobe, Flores, & Teh, 2014; Senga Green, 2016; Wright, Rowe, et al., 2013).

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| **Taxonomic group** | **Species** | **Water type** | **Polymer type** | **Particle shape** | **Particle size range** | **Endpoint** | **Reported effect level** | **Exposure duration (d)** | **Extrapolation factor** | **Effect threshold (g/kg DW)** | **Chronic LOEC after extrapolation (g/kg DW)** | **Exposure medium** | **Reference** |
| Annelida | *Arenicola marina* | Marine | UPVC | Irregular | 37.5 - 500 µm | Egestion | LOEC | 2 | 10 | 62.5 | 6.25 | ***Sediment*** | Wright et al., 2013 |
| Annelida | *Arenicola marina* | Marine | UPVC | Irregular | 37.5 - 500 µm | Energy budget | LOEC | 28 | 1 | 12.5 | 12.5 | ***Sediment*** | Wright et al., 2013 |
| Annelida | *Arenicola marina* | Marine | UPVC | Irregular | 37.5 - 500 µm | Feeding | LOEC | 28 | 1 | 62.5 | 62.5 | ***Sediment*** | Wright et al., 2013 |
| Annelida | *Arenicola marina* | Marine | PS | Sphere | 0.4 - 1.3 mm | Feeding | LOEC | 10 | 6.5 | 0.74 | 0.11 | ***Sediment*** | Besseling et al., 2013 |
| Annelida | *Arenicola marina* | Marine | HDPE | Sphere | 10 - 180 µm | Feeding | LOEC | 28 | 1 | 0.5 | 0.5 | ***Sediment*** | Besseling et al., 2017 |
| Annelida | *Arenicola marina* | Marine | PLA | Sphere | 1.4 - 707 µm | Metabolism | LOEC | 31 | 1 | 25 | 25 | ***Sediment*** | Green et al., 2016 |
| Annelida | *Arenicola marina* | Marine | HDPE | Sphere | 2.5 - 316 µm | Metabolism | LOEC | 31 | 1 | 25 | 25 | ***Sediment*** | Green et al., 2016 |
| Annelida | *Arenicola marina* | Marine | PVC | Sphere | 8.7 - 478 µm | Metabolism, feeding | LOEC | 31 | 1 | 25 | 25 | ***Sediment*** | Green et al., 2016 |
| Annelida | *Arenicola marina* | Marine | UPVC | Irregular | 37.5 - 500 µm | Phagocytosis | LOEC | 28 | 1 | 6.25 | 6.25 | ***Sediment*** | Wright et al., 2013 |
| Chlorophyceae, diatomea | Microphytobenthos (microalgae, diatoms) | Marine | PLA | Sphere | 1.4 - 707 µm | Biomass, chlorophyll content | LOEC | 31 | 1 | 25 | 25 | ***Sediment*** | Green et al., 2016 |
| Chlorophyceae, diatomea | Microphytobenthos (microalgae, diatoms) | Marine | HDPE | Sphere | 2.5 - 316 µm | Biomass, chlorophyll content | LOEC | 31 | 1 | 25 | 25 | ***Sediment*** | Green et al., 2016 |
| Chlorophyceae, diatomea | Microphytobenthos (microalgae, diatoms) | Marine | PVC | Sphere | 8.7 - 478 µm | Biomass, chlorophyll content | LOEC | 31 | 1 | 25 | 25 | ***Sediment*** | Green et al., 2016 |
| Chordata | *Dicentrarchus labrax* | Marine | PVC | Irregular | < 300 µm | Tissue alterations | LOEC | 90 | 1 | 1 | 1 | ***Food*** | Peda et al., 2016 |
| Chordata | *Oryzias latipes* | Marine | PE | Irregular | < 500 µm | Gene expression, germ cell development | LOEC | 90 | 1 | 100 | 100 | ***Food*** | Rochman et al., 2014 |
| Chordata | *Sparus aurata* | Marine | PVC |  | 40 - 150 µm | Oxidative stress, liver damage | LOEC | 30 | 1 | 0.1 | 0.1 | ***Food*** | Espinosa et al., 2017 |
| Echinodermata | *Lytechinus variegatus* | Marine | PE | Pellet | < 5 mm | Embryo development | LOEC | 1 | 10 | 148.8 | 14.88 | ***Food*** | Nobre et al., 2015 |