

APPENDIX 1. EXAMPLES OF DEMONSTRATED/POTENTIAL IMPACTS OF MARINE MICROPLASTIC POLLUTION ON BIODIVERSITY (KEY PUBLISHED STUDIES AS OF APRIL 2016)

Primary impact mechanism	Secondary impact mechanism	Demonstrated/potential impacts(s)
Direct ingestion or uptake via water column of plastic particles by organisms (demonstrated in over 50 marine species ¹)	Release of adsorbed hydrophobic marine chemicals into organism tissues	<ul style="list-style-type: none"> • Mortality of marine worms as well as reduced burrowing ability and internal injuries when exposed to adsorbed hydrophobic chemicals on polyvinyl chloride (PVC)² • Hormone disruption and tumour formation in adult freshwater fish when exposed to adsorbed hydrophobic chemicals on Polyethylene (PE) pellets³ • Transfer to and accumulation in tissues of adult freshwater fish when exposed to adsorbed hydrophobic chemicals on PE microbeads⁴ • Inhibition of neurotransmitters and oxidative stress in common gobies (prey species of cod) when exposed to mixture of PE microspheres and hydrophobic pyrene (environmental contaminant)⁵ • Reduced immune system response and genetic mutation in blue mussel exposed to PE and PS microplastics and hydrophobic pyrene (environmental contaminant)⁶
	Release of inherent chemical additives into organism tissues	<ul style="list-style-type: none"> • Mortality (at high concentrations) and decrease in fecundity (at all concentrations) in planktonic crustaceans when exposed to various sizes of polystyrene (PS) microparticles (<i>NB impact mechanism was not examined</i>)⁷ • Mortality of marine worms as well as reduced burrowing ability and internal injuries when exposed to additives leaching from PVC⁸
	Persistence/elevated presence in digestive organs of organisms	<ul style="list-style-type: none"> • Potential starvation/reduced body condition in 15 species of surface-feeding European seabirds⁹ (<i>NB cited study only records increasing frequency of presence, not observed impact</i>) • Deterioration/inflammation of tissues in blue mussels when exposed to high-density polyethylene (HDPE) pellets¹⁰ • Reduced feeding activity and reduced energy reserves in marine worms when exposed to sediment containing microscopic unplastified polyvinylchloride (UPVC)¹¹
	Trophic food web transfer from low to high level organisms	<ul style="list-style-type: none"> • Potential reduced health of commercial organism when blue mussels transfer PS microspheres to brown crabs (<i>NB cited study only records transfer of PS, not observed impact</i>)¹² • Potential multi-generational mortality and reduced health when PS microspheres transferred between low trophic level worms and copepods to higher trophic level shrimp (<i>NB cited study only records transfer of PS, not observed impact</i>)¹³
	Intergenerational transfer	<ul style="list-style-type: none"> • Potential multi-generational reduced health and size and potential perforation of digestive organs when various polymers transferred between adult and fledgling Cory's shearwater (<i>NB cited study only records transfer, not observed impact</i>)¹⁴
	Concentration in high trophic level organisms	<ul style="list-style-type: none"> • Potential population level threat (given observed declines) in fin whales ingesting variety of microplastics and adsorbed/leached contaminants (<i>NB cited study only records presence of microplastics and contaminants, not impact</i>)¹⁵ • Potential mortality in True's beaked whale with microplastics in digestive tract (<i>NB cited study only records presence of microplastics and contaminants, not impact</i>)¹⁶
Presence in intertidal or subtidal habitats	Provision of altered and/or supplementary habitat	<ul style="list-style-type: none"> • Increase of marine bacterial density and resulting potential for invasive species transport observed in North and South Pacific, North Atlantic and in various microbial species i.e. microplastics acting as vector for high concentrations of potentially invasive organisms^{17,18,19} • Increased egg density and resulting alteration of ecosystem structure observed in a marine insect in habitats with high microplastic loads²⁰
	Release of inherent chemical additives into organism tissues (without ingestion)	<ul style="list-style-type: none"> • Increase of anomalous larvae development of sea urchins when exposed to additives leaching from PE pellets²¹

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