

Facts and Figures: Personal Protective Equipment (PPE) and Ocean Plastic Pollution



PPE

- Personal protective equipment, or PPE, is defined as “protective clothing, helmets, gloves, face shields, goggles, facemasks and/or respirators or other equipment designed to protect the wearer from injury or the spread of infection or illness” (SOURCE: [U.S. FDA](#)).
- Disposable face masks are predominately made of woven polypropylene plastic (SOURCE: [Journal of Hazardous Materials](#)), but often also contain other polymers including polystyrene, polycarbonate, polyethylene, and polyester (SOURCE: [Science of The Total Environment](#)).
- Disposable medical gloves are made of materials such as latex, vinyl, nitrile, and other synthetic polymers (SOURCE: [Government of Canada](#)).
- Disposable surgical gowns are typically also comprised, at least partially, of synthetic polymers including polyethylene, polypropylene and polyethylene terephthalate (SOURCE: [Environmental Science & Technology](#)).
- Globally, it is estimated that 129 billion masks and 65 billion gloves have been used monthly during the COVID-19 pandemic, equating to nearly 3 million face masks used per minute (SOURCE: [Environmental Science and Technology; Independent](#)).
- In mid-2020, global disposable face mask sales were predicted to increase from \$800 million in 2019 to about \$166 billion by the close of 2020 (SOURCE: [United Nations](#)).
- Because disposable face masks are made from a myriad of plastic polymers, littered or improperly disposed masks can contribute to microplastic pollution as they degrade (SOURCE: [Science of the Total Environment](#)). Scientists found that a single disposable face mask may release up 173,000 microplastic microfibrils per day into the marine environment (SOURCE: [Environmental Advances](#)).

Plastic Waste and Recycling

- HDPE (high-density polyethylene), LDPE (low-density polyethylene), PP (polypropylene) and PET (polyethylene terephthalate) together represent 85% of all single-use plastics by volume (SOURCE: [McKinsey](#)).
- Since the invention of plastics to 2015, 8.3 billion metric tons of plastics have been produced. Of that, 6.3 billion metric tons have become plastic waste, with only 9% recycled, 79% sent to landfills or leaked into the environment, and 12% incinerated (SOURCE: [Science Advances](#)).

In the United States

- The United States is the number-one generator of plastic waste globally, and ranks as high as third among countries contributing to coastal plastic pollution (SOURCE: [Science Advances](#)).
 - According to 2016 data, more than half of all plastics collected in the U.S. for recycling (1.99 million metric tons of 3.91 million metric tons collected) were shipped abroad. Of this, 88% of exports went to countries struggling to effectively manage, recycle, or dispose of plastics.
 - Up to 1 million metric tons of U.S.-generated plastic waste in 2016 ended up polluting the environment beyond its own borders.
- In 2018, the U.S. generated 292.4 million tons of waste; about 12% of it, or 35.7 million tons, was plastic (SOURCE: [EPA](#)).
- Plastics have the lowest recycling rate of any other material category. In 2018, the U.S. recycled 68.2% of paper and paperboard waste; 34.1% of metal (steel, aluminum, other nonferrous metals) waste; 25.0% of glass waste; but just 8.7% of plastic waste (SOURCE: [EPA](#)).
- Nearly 76% of plastics generated in 2018 in the U.S. were landfilled (SOURCE: [EPA](#)).
- In 2018, plastics made up 18.5% of U.S. landfill waste; only food, at 24.1%, made up more (SOURCE: [EPA](#)).

Ocean Plastic Pollution

- An analysis of 2016 data estimates that approximately 11 million metric tons of plastic pollution enters the ocean every year (SOURCE: [Science](#)).
- It is estimated that between 24 and 35 million metric tons of plastics entered aquatic ecosystems (both freshwater and marine environments) in 2020 (SOURCE: [Science](#)).
- Plastic pollution inputs into rivers, lakes and the ocean could increase to as much as 53 million metric tons annually by 2030 even if current reduction commitments are met (SOURCE: [Science](#)). This is equivalent to about one cargo ship's worth of plastics, by weight, entering aquatic ecosystems every single day (SOURCE: [Ocean Conservancy](#)).
- Plastic has been found in every corner of the ocean, from the deepest trench (SOURCE: [CNN](#)) to the most remote Arctic ice (SOURCE: [Reuters](#)). Plastics have also entered the atmosphere (SOURCE: [NPR](#)).
- Two of the most widely-produced plastic polymers in the world are polyethylene (PE) and polypropylene (PP); unfortunately, PE and PP are also some of the most commonly encountered plastics in the ocean (SOURCE: [Science Advances](#)).
- More than 800 marine species are impacted by plastics, from the tiniest zooplankton to the largest whales (SOURCE: [UN Report](#)).
- Thread-like microplastics, called microfibers, are produced from synthetic textiles shedding or abrading, but can also be formed when larger items containing fibrous plastic materials like cigarette filters break down (SOURCES: [PLOS ONE](#); [Science of the Total Environment](#)).
- A review paper of research published in 2019-2020 found that 60% of fish studied globally contained microplastics, and carnivorous fish had more microplastics than omnivores (SOURCE: [Marine Pollution Bulletin](#)).
- Microfibers are the most prevalent category of microplastics ingested by marine fishes, crustaceans, and bivalves, typically representing more than 90% of plastics ingested (SOURCE: [Marine Pollution Bulletin](#)). Ingestion of microplastic fragments, films, and pellets by fish have also been observed but typically represent a smaller proportion than fibers (SOURCE: [Marine Pollution Bulletin](#)).
- A recent study estimated children take in roughly 550 microplastics per day and adults take in 880 per day through breathing as well as consumption of eight food and beverage types (including fish, mollusks, tap water, bottled water, and milk) (SOURCE: [Environmental Science & Technology](#)). Microplastics have also been found in numerous other foods and beverages such as beer, honey, and salt (SOURCE: [Environmental Science & Technology](#)).
- Ocean plastic pollution costs the global economy an estimated \$2.5 trillion annually (SOURCE: [Marine Pollution Bulletin](#)).
- Volunteers with Ocean Conservancy's International Coastal Cleanup collect millions of pounds of trash – mostly plastics – from beaches and waterways around the world every year, in a single day. Common items include cigarette butts (which contain plastic filters), plastic bags, plastic beverage bottles, plastic bottle caps, straws and stirrers, plastic lids, plastic/foam take-out containers, and plastic cutlery (SOURCE: [Ocean Conservancy](#)).
- Every year since 2017, all of the top 10 items found on beaches and waterways during Ocean Conservancy's International Coastal Cleanup have been single-use plastics (SOURCE: [Ocean Conservancy](#)).
- A 2020 study investigating plastic-related deaths across 80 cetacean (e.g. dolphins and whales), pinniped (e.g. seals and walruses), sea turtle, and seabird species found flexible plastics are responsible for the largest proportion of debris-related deaths; other highly lethal items include plastic bags/sheets/packageing, rope/fishing nets, fishing tackle and balloons (SOURCE: [Conservation Letters](#)).