

Facts and Figures: Foodware and Ocean Plastic Pollution



Plastics and Foodware

- Food delivery services have grown 12–36% during the COVID-19 pandemic, increasing food packaging waste in the U.S. by 15% (SOURCE: [Trends in Food Science & Technology](#)).
- Among all food packaging materials, plastics are the most widely used. In 2019, 83% of flexible food packaging was made from plastic, as was 45% of all rigid food packaging (SOURCE: [Materials Circular Economy](#)).
- Polyethylene terephthalate (PET), polypropylene (PP), polyvinyl chloride (PVC), polystyrene (PS), and polyethylene (PE) (including low-density polyethylene [LDPE] and high-density polyethylene [HDPE]) are the five most-used polymers for food packaging applications (SOURCE: [Materials Circular Economy](#)).
- All plastics contain chemical mixtures which help them achieve desired material properties. Through direct contact, these chemicals can transfer from foodware plastics directly into foods and beverages that humans consume (SOURCE: [Environmental Health](#)).
- Ocean Conservancy's 35-year International Coastal Cleanup dataset indicates disposable food-related items show up as litter in our communities, on our beaches, and in our waterways at higher rates than other consumer items (SOURCE: Ocean Conservancy).
- Foamed polystyrene – used to make foam takeout containers – has been ingested by and documented in a wide range of marine animals including: birds (albatross, petrels, gulls, boobys, fulmars), shellfish (crabs, mussels, barnacles), marine mammals (seals, sea lions, porpoises), and turtles (green, loggerhead) (SOURCE: [Environmental Science & Technology](#)).
- Disposable paper cups are typically lined with polyethylene plastic. Scientists discovered that when hot (~90 °C) water is poured into these cups, up to 25,000 microplastics and toxic heavy metals like lead, chromium and cadmium are released into the surrounding liquid, posing a possible human health risk ([Journal of Hazardous Materials](#)).

- In 2020, scientists discovered through laboratory testing that plastic takeout containers and disposable plastic cups shed microplastics during use, representing a potentially important vector of direct human and environmental exposure to microplastics (SOURCE: [Chemosphere](#)).
- Laboratory experiments investigating fragmentation of disposable polystyrene plates and polypropylene beverage cups in simulated coastal environments revealed these items can be completely fragmented into microplastics (<5mm) within 24 hours depending on the sediment composition (large and small pebbles, granules, sand) of the beach swash zone (area where broken waves move toward the shore). Coarser sediments caused these foodware items to fragment into more microplastics in the 24-hour experimental window than finer sediments (SOURCE: [Marine Pollution Bulletin](#)).

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 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](#)).
- 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

- An analysis of 2016 data estimates that approximately 11 million metric tons of plastic pollution enters the ocean every year (SOURCE: [Pew/Systemiq](#)). This represents more than a garbage truck's worth of plastics entering the ocean every minute (SOURCE: Ocean Conservancy estimate).
- 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](#)).
- To date, nearly 1,600 species have been reported to ingest plastics, with roughly 1,300 of those being ocean-dwellers (SOURCE: [Science](#)).
- 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](#)).
- 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](#)).
- A 2020 study investigating plastic-related deaths across 80 cetacean (e.g. dolphins and whales), pinniped (e.g. seals and walrus), 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/packaging, rope/fishing nets, fishing tackle and balloons (SOURCE: [Conservation Letters](#)).