WILDLIFE OVER WASTE

Polystyrene Waste Contaminates Habitats and Harms Wildlife

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Polystyrene Food Containers End Up as Waste and Litter…

- Americans throw away 840,000 tons of polystyrene plates and cups every year and used 25 billion foam cups in 1990.[1]
- Dunkin Donuts sells 1 billion foam cups every year, although had begun to phase them out as of early 2018.[2]
- Polystyrene is extremely difficult to recycle. It is easily crushed and shredded, mistaken for paper, missed by manual sorters, and contaminates other parts of the waste stream harming other recycling efforts.[3]

... And Find Their Way into Critical Animal Habitats

Because it biodegrades slowly, floats in water, and blows in wind, polystyrene litter ends up scattered through critical wildlife habitats like beaches and oceans:[4]

- A 1998 survey of beach debris in Orange County, California, found that foamed plastic – largely polystyrene – made up more than 40 percent of materials collected.[5]
- In the ocean, polystyrene foam is the most frequently observed plastic litter, and has been found in remote corners of the Arctic.[6]
- Polystyrene in water and soil breaks down over time into tiny pieces known as microplastics, which are easily ingestible by wildlife and can absorb toxic pollution from the environment.[7] In the ocean, these microplastics float near the surface in areas that are critical feeding areas for many types of marine life, including whales.[8]

Polystyrene Harms Wildlife

- Nearly 200 species have been reported to ingest ocean plastic pollution.[9] Scientists predict that as ocean plastic pollution increases, by 2050, 99 percent of all seabird species will consume plastics.[10]
- When animals eat plastic, including polystyrene, it can block their digestive systems.[11]
- Polystyrene microplastics soak up organic toxics and chemical pollutants from the environment, and pose a toxic risk to animals that consume them.[12]
- Specific animals at risk include:
    - **Sea turtles:** Ingested plastic can cause internal injuries, intestinal blockage, harm to swimming ability and buoyancy, and accumulation of toxic chemicals.[13]
    - **Seabirds:** Seabirds frequently ingest plastic, which can result in injury, death, and harm to reproduction.[14]

- **Whales:** Blubber samples taken from filter-feeding whales, which trap enormous amounts of water in their mouths during feeding, suggest that they could be consuming harmful amount of toxic chemicals found in microplastics.[15]
- **Earthworms:** Studies suggest that exposure to polystyrene microplastics harms earthworms, inhibiting growth and increasing mortality.[16] Harm to earthworms and other small soil organisms could put larger terrestrial ecosystems at risk.[17]

Polystyrene Bans Work

Polystyrene bans have proven effective at reducing litter. From 2008 to 2012, after the California cities of Santa Cruz and Pacific Grove banned polystyrene foam food ware, polystyrene litter on local beaches decreased by as much as 71 percent.[18]

Endnotes

[1] 840,000 tons: U.S. Environmental Protection Agency, Advancing Sustainable Materials Management: 2014 Tables and Figures, December 2016, available at https://www.epa.gov/sites/production/files/2016-11/documents/2014_smm_tablesfigures_508.pdf; 25 billion: U.S. Environmental Protection Agency, *10 Fast Facts On Recycling*, archived at http://web.archive.org/web/20040713080504/http://www.epa.gov:80/reg3wcmd/solidwasterecyclingfacts.htm.

[2] Dunkin' Donuts, *Dunkin' Donuts to Eliminate Foam Cups Worldwide in 2020* (press release), 7 February 2018, available at https://news.dunkindonuts.com/news/dunkin-donuts-to-eliminate-foam-cups-worldwide-in-2020.

[3] New York City Department of Sanitation, *Determination on the Recyclability of Food-Service Foam*, 12 May 2017, available at http://www1.nyc.gov/assets/dsny/docs/2017-05-12FoamDetermination_FINAL.pdf.

[4] David Kaplan et al., "Biodegradation of Polystyrene, Poly(methyl methacrylate), and Phenol Formaldehyde," *Applied and Environmental Microbiology*, 28(3), September 1979, available at http://aem.asm.org/content/38/3/551.full.pdf.

[5] Los Angeles County, *An Overview of Expanded Polystyrene Food Containers in Los Angeles County Part One*, October 2008, available at http://dpw.lacounty.gov/epd/eps/pdf/eps_staff_report.pdf.

[6] Most commonly observed litter: Marcus Eriksen et al., Plastic Pollution in the World's Oceans: More than 5 Trillion Plastic Pieces Weighing over 250,000 Tons Afloat at Sea, *PLoS ONE,* 9(12): e111913, DOI:10.1371/journal.pone.0111913, 10 December 2014; found in Arctic: Sarah Knapton, "Plastic Waste Now Polluting Arctic Ocean, Scientists Find," *The Telegraph,* 25 September 2017.

[7] Dongdong Cao et al., "Effects Of Polystyrene Microplastics On The Fitness Of Earthworms In An Agricultural Soil," *IOP Conference Series: Earth and Environmental Science*, doi :10.1088/1755-1315/61/1/012148, 2017, available at http://iopscience.iop.org/article/10.1088/1755-1315/61/1/012148/pdf.

[8] Maria Fossi et al., "Are Baleen Whales Exposed To The Threat Of Microplastics? A Case Study Of The Mediterranean Fin Whale (Balaenoptera Physalus)," *Marine Pollution Bulletin,* doi: 10.1016/j.marpolbul.2012.08.013, November 2012*,* available at https://www.sciencedirect.com/science/article/pii/S0025326X12004122.

[9] 208 species have been reported to ingest marine debris; 87% of those species ingested plastic: S.C.Gall and R.C.Thompson, "The Impact Of Debris On Marine Life," *Marine Pollution Bulletin*, DOI: 10.1016/j.marpolbul.2014.12.041, 10 February 2015, available at https://indicit-europa.eu/cms/wp-content/uploads/2017/07/Gall-Thompson-2015-MarPollBull_Impact-of-debris-on-marine-life.pdf.

[10] Chris Wilcox et al., "Threat Of Plastic Pollution To Seabirds Is Global, Pervasive, And Increasing," *PNAS,* 31 August 2015, available at http://www.pnas.org/content/pnas/early/2015/08/27/1502108112.full.pdf.

[11] S.C.Gall and R.C.Thompson, "The Impact Of Debris On Marine Life," *Marine Pollution Bulletin*, DOI: 10.1016/j.marpolbul.2014.12.041, 10 February 2015, available at https://indicit-europa.eu/cms/wp-content/uploads/2017/07/Gall-Thompson-2015-MarPollBull_Impact-of-debris-on-marine-life.pdf.

[12] M.L. Taylor, "Plastic Microfibre Ingestion By Deep-Sea Organisms," *Scientific Reports*, doi:10.1038/srep33997, 2016.
[13] Christopher Pham et al., "Plastic Ingestion In Oceanic-Stage Loggerhead Sea Turtles (Caretta Caretta) Off The North Atlantic Subtropical Gyre," *Marine Pollution Bulletin*, 2017, available at https://pdfs.semanticscholar.org/b43e/3407a9248a41d858fb755b2ce801d7ad6126.pdf; sea turtles ingest polystyrene specifically: Lazar B et al., "Ingestion Of Marine Debris By Loggerhead Sea Turtles, Caretta Caretta, In The Adriatic Sea," Marine Pollution Bulletin, 2010, available at https://www.ncbi.nlm.nih.gov/pubmed/21036372.
[14] See note 10; polystyrene specifically: Marie Y. Azzarello & Edward S. Van Vleet, "Marine Birds And Plastic Pollution," *Marine Ecology - Progress Series*, 37(295-303), 6 May 1987, available at https://pdfs.semanticscholar.org/414c/d3b9aef5b0adfe7195f7b0c904f55539efd6.pdf.
[15] See note 8.
[16] See note 7.
[17] Ibid.
[18] California Senate Committee On Environmental Quality, *Bill Analysis of Senate Bill 705 from 2017-2018 Legislative Session*, 5 April 2017, available for download from https://leginfo.legislature.ca.gov/faces/billAnalysisClient.xhtml?bill_id=201720180SB705#.