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Marine Debris: NOAA's Role

Marine debris, especially plastic debris, occurs in most marine environments and is expected to increase in volume under current plastic production and waste management trends. Marine debris affects both the environment and human use of the environment. Once in the marine environment, debris may be nearly impossible to track back to individual sources. Congress has passed legislation directing several agencies to address various aspects of marine debris, including the designation of the National Oceanic and Atmospheric Administration (NOAA) as lead agency in federal efforts to prevent, mitigate, and research marine debris.

What Is Marine Debris?

Marine debris is defined in statute as "any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or Great Lakes" (33 U.S.C. §1956). The majority of marine debris is plastic and discarded after a single use, but it also may include metals, rubber, paper, textiles, derelict fishing gear, vessels, and other lost or discarded items.

Microplastics

Many plastics in the marine environment are considered *microplastics*, defined generally as pieces of plastic 5 millimeters or smaller in size. Microplastics are categorized in two ways: (1) primary microplastics, which include abrasives added to personal care (e.g., face washes) or industrial products, fibers from synthetic textiles (known as microfibers), fragments from tire abrasion, and virgin resin pellets, and (2) secondary microplastics, which form through the natural degradation and fragmentation of larger plastic items. Microplastics have been found in most marine environments and in several foodstuffs, including tap water, bottled water, and table salt.

Sources and Amounts of Marine Debris

Most marine debris comes from sources on land. Land-based waste is transported to the ocean via direct runoff, rivers, and tributaries due to inadequate waste disposal and management, industrial activities, construction, illegal dumping, and natural or human-caused disasters. According to a 2015 study by Jambeck et al., between 4.8 million and 12.7 million metric tons of land-based plastic waste entered the global ocean in 2010. A 2017 study by Schmidt et al. found that 10 rivers were pathways for adding more than a quarter of all plastic debris into the ocean. It is unclear how much marine debris is derived from at-sea sources, such as container ships, fishing boats, and other vessels, although researchers believe it is less than land-based sources. Most of the at-sea debris includes lost fishing gear and lost or discarded items.

Estimates also differ on how much marine debris is already in the ocean. Scientists have noted that available estimates of total amounts of debris are likely underestimated due to the high variability and difficulty associated with sampling debris of different sizes throughout the ocean.

The dynamic combination of diverse marine debris sizes and sources, ocean currents, and wind cause areas around the world to become host to various amounts and types of debris at different times. For example, analyses by Ribic et al. (2010 and 2012) of long-term surveys completed along the Pacific and Atlantic coasts of the United States show varying amounts of debris over time. Marine debris has been recorded in numerous marine environments, such as the deep sea, coral reefs, the polar regions, and estuaries. Marine debris also may concentrate into certain areas, such as the North Pacific Gyre (also known as the *garbage patch*) or arrive back onshore (**Figure 1**).

Figure 1. Marine Debris on a Hawaiian Shoreline

Source: NOAA Marine Debris Program.

Effects on the Environment and Humans

Marine debris may have varying effects on marine wildlife and human uses of marine environments. In the environment, marine debris may impact wildlife in several ways. Wildlife may become entangled with items such as derelict fishing gear (e.g., nets, lines), rubber bands, and balloon strings and, as a result, can experience injury, illness, suffocation, starvation, and death. Wildlife also are at risk of ingesting marine debris, which may lead to physical impacts (e.g., starvation, internal injury, blockage). Chemicals within the debris, which may transfer from the debris to the consumer upon ingestion, can cause chemical impacts (e.g., inflammation, reproductive or development impairment) as well. Potential effects may transfer to offspring, although there is currently mixed evidence of population-level consequences.

Several studies have noted the effects of marine debris on human uses of coastal and ocean resources. Debris at the water's surface can cause navigation and boating hazards, whether through damage to the vessel on impact with debris or via tangled propellers and clogged intake pipes. Communities with shoreline marine debris may experience a decrease in aesthetic value and tourism and could incur higher cleaning and maintenance costs to keep beaches and coastal waters open and clean.

NOAA and Marine Debris

Congress has passed legislation directing several agencies to prevent and mitigate at-sea and land-based marine debris. Congress enacted the Marine Debris Research, Prevention, and Reduction Act (Marine Debris Act; P.L. 109-449) and Marine Debris Act amendments (P.L. 112-213; 33 U.S.C. §§1951-1958) in 2006 and 2012, respectively. The Marine Debris Act instructed NOAA to establish the Marine Debris Program (MDP) to "identify, determine sources of, assess, prevent, reduce, and remove marine debris and address the adverse impacts of marine debris on the economy of the United States, the marine environment, and navigation safety" (33 U.S.C. §1952). NOAA MDP monitors shoreline marine debris and supports projects and partnerships with state and local agencies, tribes, nongovernmental organizations, academia, and industry.

The Marine Debris Act also reestablished the Interagency Marine Debris Coordinating Committee (IMDCC; 33 U.S.C. §1954), with NOAA as chair. The IMDCC coordinates federal agency activities and makes recommendations about research priorities, monitoring, and regulatory action. It includes 11 agencies: NOAA; Department of the Interior agencies (Bureau of Safety and Environmental Enforcement, U.S. Fish and Wildlife Service, and National Park Service); Department of Justice; Department of State; Marine Mammal Commission; U.S. Army Corps of Engineers; U.S. Coast Guard; U.S. Environmental Protection Agency; and U.S. Navy.

Potential Issues for Congress

The 115th Congress passed legislation (P.L. 115-123 and P.L. 115-265) that affect NOAA's marine debris-related activities in several ways (**Table 1**). Congress also may consider marine-debris related issues not addressed in the new laws, such as recent public discourse about single-use plastic items (i.e., plastic bags and straws), which has spurred some local and state governments and private companies to respond. It also may examine whether there should be a larger federal role in national and international waste management regulations and technologies to prevent debris from entering the environment, as some stakeholders have urged.

Marine debris likely will remain an issue of national and international concern, due to its durability and mobility via the wind and ocean currents and to expected plastic production trends and waste management practices internationally.

Table 1. Bills Enacted or Introduced in the 115th Congress (As of October 15, 2018)

Public Law or Bill Number	Marine Debris Provisions
P.L. 115-123 (H.R. 1892, Title II, Division B): Bipartisan Budget Act of 2018	Appropriates additional amounts to NOAA for marine debris assessment and removal related to Hurricanes Harvey, Irma, and Maria.
P.L. 115-265 (S. 3508, Title I; similar to S. 756, Title I): Save Our Seas Act of 2018	Amends the Marine Debris Act to expand NOAA MDP responsibilities, permit NOAA to identify and respond to severe marine debris events, encourage international efforts in solid waste management, expand membership in the IMDCC, and authorize appropriations for the MDP, IMDCC, federal information clearinghouse, and USCG marine debris efforts. P.L. 115-265 also expresses support for the NOAA Great Lakes Land-Based Marine Debris Plan.
H.R. 2518 (Title IV, Section 406): Coast Guard Authorization Act of 2017	Would add authorization of appropriations for the USCG to carry out the Marine Debris Act.
H.R. 2748: Save Our Seas Act of 2017	Similar to P.L. 115-265 and S. 756, but with differences in wording, an emphasis on providing assistance to rural and remote communities and habitats of national concern, and a higher amount authorized for administrative costs, among other differences.
H.R. 3686 (Title II): Disaster Relief Appropriations Act, 2017	Would appropriate additional amounts to NOAA for marine debris surveys for coastal states impacted by Hurricane Harvey.
H.R. 4667 (Title II): Further Additional Supplemental Appropriations for Disaster Relief Requirements, 2017	Would appropriate additional amounts to NOAA for marine debris assessment and removal related to Hurricanes Harvey, Irma, and Maria.
H.R. 5763 (Title I, Section 104): Albatross and Petrel Conservation Act	Would authorize NOAA to research the effects of marine debris on the species and would develop and implement conservation efforts to minimize these effects.

Source: CRS.

Notes: Bills noted above include marine debris provisions in their most recent versions. IMDCC = Interagency Marine Debris Coordinating Committee; MDP = Marine Debris Program; NOAA = National Oceanic and Atmospheric Administration; USCG = U.S. Coast Guard

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