



Working to stop
the flow of trash
and other human-
made debris to
the marine
environment

www.PlasticDebris.org

September 7-9 2005: Plastic Debris Conference

Plastic Debris

Marine debris: our oceans are filled with it

Are the oceans a global garbage dump?

Historically, oceans have been used as dumping grounds for waste. As a result, marine debris pollutes oceans throughout the world.¹ The National Academy of Sciences estimates that 6.4 million tons of litter enters the world's oceans each year.² Other sources suggest that as many as 8 million pieces of litter enter our oceans and seas every day.³

Plastic is persistent. It breaks into smaller pieces through photo degradation, but it never goes away.

Plastic is the most common type of marine litter worldwide.⁴

Globally, the proportion of plastic among marine debris worldwide ranges from 60 to 80%, although it has reached over 90–95% in some

areas.⁵ Plastics comprise up to 90% of floating marine debris.⁶ AMRF found **six times more plastic than plankton** by mass floating in an area of the Pacific Ocean known as the North Pacific Central Gyre.⁷ Studies of the beaches and ocean bottom in southern California show that plastic materials are the most common type of human-made debris found in the region.⁸

The quantities of plastic in the world's oceans are increasing significantly. Within the Southern Atlantic Ocean, the amount of debris increased 100-fold during the early 1990s.⁹ In the coastal areas of Japan during the 1970s to 1980s, marine plastic-particle densities increased ten fold every ten years. However, in the 1990s, densities appear to have increased ten fold every 2–3 years.¹⁰

Plastic pollutes oceans worldwide.

Recent research shows that plastic is prevalent at all depths, from the surface of the ocean throughout the water column and in sediments.¹¹ Because it is lightweight, floating plastic travels around the globe in ocean currents, often littering beaches far from where it was released.¹²



90% of Laysan Alb-tross chicks carcasses contain plastic.¹⁵

Marine Debris: Trash that Kills

Marine debris is known to have affected at least 267 species worldwide, including 86% of all sea turtle species, 44% of all sea bird species, and 43% of marine mammal species, primarily through ingestion, starvation, suffocation, and entanglement and ingestion.¹³ In the 1980s, researchers estimated that there were 100,000 marine mammal deaths per year in the North Pacific related to entanglement in plastic nets and fishing line.¹⁴





To achieve zero discharge of trash to storm water, LA County estimates it will cost \$400 million over 12 years.

Land-based sources contribute 80% of marine debris¹⁶

Land-based sources of marine debris include:

Plastic is the most common type of litter washed to the ocean and beaches by urban runoff in California.

- People that litter
- Municipal landfills
- Transportation of garbage and debris
- Open trash collection containers at businesses and public venues
- Industrial facilities
- Beach visitors

Industrial Sources

Plastic resin production, manufacturing, packaging and transportation facilities that do not employ best management practices can release significant quantities of plastic pellets and powders to the marine environment through rivers and channels, many of which flow directly to the ocean.

Plastics industrial facilities can prevent releases of plastic pellets and powders by employing the practices recommended in Operation Clean Sweep, an industry-led housekeeping program aimed at achieving zero plastic pellet and powder loss. Find out more about the program at www.opcleansweep.org.

Pellets and powders are frequently spilled from rail cars and on-site at manufacturing facilities.



Post Consumer Waste

Almost all storm drains flow directly to waterways that empty to the ocean. Post-consumer waste, or litter, is the primary source of trash in urban runoff.

The litter problem is related to:

- Failure to properly dispose of waste
- Increasing amounts of single-use disposable products and packaging

In the U.S. in 1960, the average amount of waste generated per person per day was 2.7 pounds, compared to 4.4 pounds in 2001.¹⁷ Plastics are the fastest growing portions of the municipal solid waste stream.

The amount of plastic recycled in the U.S. in 2001 was 5.5% of the plastic waste generated.¹⁸ Recycling plastic is increasingly difficult as many products are made of composite materials and plastics that are difficult to recycle.

U.S. production of plastics has grown at a rate of 4.9% per year since 1973, reaching sales of more than 50 million tons in 2000. U.S. resin sales grew at an average annual rate of 5% between 1960 and 2000, growing from 6 billion pounds to 108 billion pounds per year.¹⁹



Urban litter flows through storm drains to creeks, rivers and the ocean.

Ocean Spills

Plastic and trash are released to the marine environment from vessels as a result of:

- Commercial and recreational fishing (nets, lines, and shellfish boxes)
- Overboard disposal of passenger and commercial shipboard wastes
- Cargo containers falling off ships in high seas



You can help stop the flow of plastic to the marine environment



1 Volunteer with AMRF.

Visit the AMRF website to read more about what the Foundation is doing to preserve and protect marine ecosystems and learn how you can get involved as a volunteer: www.algalita.org.

2 Participate in the Plastic Debris, Rivers to Sea Conference.

The conference will present results of the Project to date. Experts from around the world will share information on the marine debris problem. Visit www.PlasticDebris.org for information. **September 7-9, 2005**

3 Minimize industrial discharges.

If your company is involved in the transport, use, or production of plastics, learn more simple steps to achieve zero pellet and powder loss at www.opcleansweep.org.

4 Don't litter and help clean up. Volunteer for a beach or creek cleanup. Call (800) COAST4U or visit www.coastal.ca.gov to find an event near you.



6 Teach others about the problem. The video, *Our Synthetic Sea* is a great teaching tool. View the video and find out how to order copies at: www.algalita.org/videos.html.

References

- 1 Faris, Jeannie; Hart, Kathy; *Seas of Debris: A Summary of the Third International Conference on Marine Debris*; N.C. Sea Grant College Program, 5.
- 2 United Nations Environment Programme, GPA Coordination Office, *Marine Litter- trash that kills*, www.gpa.unep.org; <http://marine-letter.gpa.unep.org/facts/what-where.htm>
- 3 UNEP.
- 4 J.G.B. Derraik, The pollution of the marine environment by plastic debris: a review, *Marine Pollution Bulletin* 44 (2002), 843.
- 5 Derraik.
- 6 UNEP.
- 7 C.J. Moore, et al, A Comparison of Plastic and Plankton in the North Pacific Central Gyre, *Marine Pollution Bulletin*, 42, (2001): 1297-1300.
- 8 S.L. Moore et al, Composition and Distribution of Beach Debris in Orange County, California, *Marine Pollution Bulletin* 42 (2001): 241-245. Shelly Moore, personal interview January 2005 regarding data collected in Southern California Bight.
- 9 Sofia Copello and Favio Quintara, Marine debris ingestion by Southern Gaint Petrels and its potential relationships with fisheries in the Southern Atlantic Ocean, *Marine Pollution Bulletin* 46 (2003): 1513-1515.
- 10 Haruo Ogi and Yuri Fukumoto, A Sorting Method for Small Plastic Debris Floating on the Sea Surface and Stranded on Sandy Beaches, *Bulletin of the Faculty of Fisheries, Hokkaido University* 51(2), 2000 71-93.
- 11 Moore, S.L. and Allen M.J., Distribution of Anthropogenic and Natural Debris on the Mainland Shelf of the Southern California Bight, *Marine Pollution Bulletin* 40 (2000): 83-88: Richard C. Thompson, et al, "Lost at Sea: Where is All the Plastic?" *Science*, Vol. 304, Issue 5672 838, 7 May 2004: UNEP.
- 12 Derraik, 842.
- 13 Laist, D.W., Impacts of marine debris: entanglement of marine life in marine debris including a comprehensive list of species with entanglement and ingestion records. In: *Coe, J.M., Rogers, D.B. (Eds.), Marine Debris- Sources, Impacts, and Solutions*: Springer-Verlag, New York, (1997), pp. 99-139.
- 14 Wallace, N. 1985. Debris entanglement in the marine environment: A review. pp. 259-277 in: R.S. Shomura and H.O. Yoshida (eds.), *Proceedings of the Workshop on the Fate and Impact of Marine Debris*. U.S. Department of Commerce, NOAA Technical Memorandum. NMFS, NOAA-TM-NMFS-SWFC-54.
- 15 Personal communication — Kathy Cousins, Protected Species Coordinator, Western Pacific regional Fishery management Council, National Oceanic and Atmospheric Administration
- 16 U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Public and Constituent Affairs (1999), "Turning to the Sea: America's Ocean Future," p. 56.
- 17 Franklin Associates, *Characterization of Municipal Solid Waste in the United States: 1998 Update* (Washington D.C.: US Environmental Protection Agency, July 1999)
- 18 United States Environmental Protection Agency, *Municipal Solid Waste Generation in the United States: 2001 Facts and Figures Executive Summary*, Office of Solid Waste and Emergency Response, EPA 530-S-03-011, 7.
- 19 *The Resin Review 2000 Edition*, American Plastics Council, Washington, D.C. 2001.

Visit www.PlasticDebris.org

The *Plastic Debris, Rivers to Sea Project* is implemented by the Algalita Marine Research Foundation, with grant funding from the State Water Resources Control Board through Proposition 13, and additional support from the California Coastal Commission.



The Plastic Debris, Rivers to Sea Project

A project to assess plastic debris loading and sources of plastic and trash in two urban California rivers. By developing an action plan for addressing these sources and fostering dialogue, the project encourages stakeholders to implement solutions to stop the flow of plastics and trash in urban runoff.

Working with the plastics industry to improve facility practices.

The Project collaborates with the plastics industry to improve Operation Clean Sweep (OCS), the industry's recommended practices for plastic manufacturers, packagers, and transporters. The project is assessing the effectiveness of OCS by monitoring the discharge to urban waterways of pellets at facilities implementing the program.

Developing strategies to reduce the discharges of other plastic and trash discharges in urban runoff through:



Monitoring

By monitoring the discharge of plastics and trash in the Los Angeles and San Gabriel rivers, the Project seeks to: (1) provide information about the extent and migration of small plastic debris that is not captured by municipal storm water programs; and (2) to characterize the types of anthropogenic debris in urban runoff.

Planning

The Project identifies actions to help government, industry, and non-profit organizations in California reduce discharges of plastics and trash in urban runoff.

Education

The project seeks to increase awareness among interested parties by providing these opportunities to learn more:

- **The Plastic Debris Rivers to Sea Conference** September 7–9, 2005
- The project website: www.plasticdebris.org
- The Plastic Debris, Rivers to Sea state-wide network

Algalita Marine Research Foundation

The Foundation is a Long Beach, California based non-profit environmental organization. AMRF is dedicated to the preservation of the marine environment. With the help of its chartered research vessel, the Oceanographic Research Vessel (ORV) Algalita, AMRF is actively engaged in innovative research, education and restoration of the marine environment.

