

Spring 2017

Plastics in the Ocean: The Environmental Plague of Our Time

Joan M. Bondareff

Blank Rome LLP

Maggie Carey

Alliance of Small Island States

Carleen Lyden-Kluss

NAMEPA

Follow this and additional works at: http://docs.rwu.edu/rwu_LR



Part of the [Environmental Law Commons](#), and the [Natural Resources Law Commons](#)

Recommended Citation

Bondareff, Joan M.; Carey, Maggie; and Lyden-Kluss, Carleen (2017) "Plastics in the Ocean: The Environmental Plague of Our Time," *Roger Williams University Law Review*: Vol. 22 : Iss. 2 , Article 4.

Available at: http://docs.rwu.edu/rwu_LR/vol22/iss2/4

Plastics in the Ocean: The Environmental Plague of Our Time

Joan M. Bondareff, Maggie Carey, and Carleen Lyden-Kluss*

INTRODUCTION

As the esteemed American comic strip character Pogo once said, “We have met the enemy and he is us.”¹ This is how the authors of this Article feel about marine debris, especially plastics that end up in the ocean. Who do we have to blame? What can be done to address this problem? Are our laws up to the task? What else needs to be done? Whether the plastics come from land-based or ship-based garbage, we need not look any further than ourselves.

This Article describes how plastics enter the marine environment, as well as their sources and the damage they cause; the adequacy of U.S. laws that prevent marine pollution by plastics; the role of the shipping industry and ports to prevent pollution; and finally, the role of organizations like the North American Marine Environment Protection Association that bring together the maritime industry and the public to address this major environmental problem of our time.

* Joan M. Bondareff, Esquire, Blank Rome LLP; Legal Counsel, North American Marine Protection Association (NAMEPA). Maggie Carey, Esquire; Oceans Advisor, Alliance of Small Island States. Carleen Lyden-Kluss, Co-Founder and Executive Director of NAMEPA.

1. *We Have Met the Enemy and He Is Us*, THIS DAY IN QUOTES (Apr. 22, 2015), <http://www.thisdayinquotes.com/2011/04/we-have-met-enemy-and-he-is-us.html>. This quote originates from a poster created by cartoonist Walt Kelly for the first Earth Day on April 22, 1970, and published again on the second Earth Day in 1971. *Id.*

I. HOW PLASTICS END UP IN THE OCEAN

A. *Definition and Extent of the Problem: Is It Growing?*

Marine debris is a problem that plagues coastlines, oceans, rivers, and even lakes around the world. Not only an eyesore, marine debris has serious negative impacts on marine habitats, marine wildlife, human health and safety, navigation, and the economy. Every year, marine mammals (e.g., whales, seals, and porpoises), birds, and other organisms (e.g., sea turtles) become entangled in, or ingest, various forms of marine debris. The National Ocean and Atmospheric Administration (NOAA), the U.S. scientific agency focused on the conditions of the ocean and atmosphere, defines marine debris 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 the Great Lakes.”²

Research shows that plastics account for anywhere between sixty to eighty percent of marine debris.³ Plastics, invented in the mid-1800s,⁴ are petroleum-based synthetic organic polymers that are lightweight, strong, durable, and cheap. Plastics include plastic bags, plastic containers, and plastic bottles and caps.⁵ Moreover, the production of plastic is continuing to grow at nine percent annually, as the demand remains high in developed countries and is growing rapidly in developing nations.⁶ In 2015, the global production of plastics was 322 million tons, up from 230 million tons in 2005.⁷

2. *What is Marine Debris?*, NAT'L OCEAN SERV., <http://oceanservice.noaa.gov/facts/marinedebris.html> (last updated Oct. 22, 2015).

3. José G.B. Derraik, *The Pollution of the Marine Environment by Plastic Debris: A Review*, 44 MARINE POLLUTION BULL. 842, 843 (2002), http://caseinlet.org/uploads/Moore—Derraik_1_.pdf.

4. Laura Parker, *First of Its Kind Map Reveals Extent of Ocean Plastic*, NAT'L GEOGRAPHIC (July 16, 2014), <http://news.nationalgeographic.com/news/2014/07/140715-ocean-plastic-debris-trash-pacific-garbage-patch/>.

5. RICHARD C. THOMPSON ET AL., SCI. & TECH. ADVISORY PANEL, MARINE DEBRIS AS A GLOBAL ENVIRONMENTAL PROBLEM: INTRODUCING A SOLUTIONS BASED FRAMEWORK FOCUSED ON PLASTIC 6–7 (2011), https://www.thegef.org/sites/default/files/publications/STAP_MarineDebris_-_website_1.pdf.

6. *Id.* at 15.

7. *Plastics—The Facts 2016: An analysis of European plastics production, demand and waste data*, PLASTICSEUROPE, <http://www.plasticseurope.org/Document/plastics-the-facts-2016-15787.aspx?FoIID=2> (last visited Jan. 4, 2017).

According to Dame Ellen MacArthur, a world-renowned sailor, “there will be more waste plastic in the sea than fish by 2050, unless the industry cleans up its act.”⁸ In January 2016, the Ellen MacArthur Foundation released a report stating that plastic production has increased twentyfold since 1964, and “[d]espite the growing demand, just [five percent] of plastics are recycled effectively, while [forty percent] end up in landfills and a third in fragile ecosystems such as the world’s oceans.”⁹

B. *Sources and Quantities: Land-Based, Shipping-Based*

According to a 2011 report produced on behalf of the Scientific and Technical Advisory Panel of the Global Environment Facility, there is a “widely accepted proposition that the problem of marine debris is predominately associated with poor management practices on land.”¹⁰ Marine debris originating from land comes from an array of sources, including improper dumping and littering, sewage and run-off, materials from recreation/beach users, and others.¹¹ Most marine debris is transported to the sea via storm drains or rivers or is blown into the sea.¹²

One significant sea-based source of marine debris is abandoned, lost, or otherwise discarded fishing gear.¹³ This creates the problem of ghost fishing, which is when abandoned fishing gear such as driftnets and longlines continue to catch fish and other marine organisms, indiscriminately and recklessly killing marine life and further depleting fish stocks.¹⁴

Another type of fishing gear that may cause harm when abandoned are fish aggregating devices (FADs).¹⁵ Many types of fish species, including tuna, tend to congregate around floating

8. Graeme Wearden, *More Plastic than Fish in the Sea by 2050, Says Ellen MacArthur*, THE GUARDIAN (Jan. 19, 2016, 9:23 AM), <https://www.theguardian.com/business/2016/jan/19/more-plastic-than-fish-in-the-sea-by-2050-warns-ellen-macarthur> (last modified Apr. 4, 2016, 7:20 AM).

9. *Id.*

10. THOMPSON ET AL., *supra* note 5, at 15.

11. *Id.* at 14.

12. *Id.*

13. *Id.*

14. *See id.*

15. DAVE GERSHMAN ET AL., THE PEW CHARITABLE TRUSTS, ESTIMATING THE USE OF FADS AROUND THE WORLD: AN UPDATED ANALYSIS OF THE NUMBER OF FISH AGGREGATING DEVICES DEPLOYED IN THE OCEAN 1 (2015), http://www.pewtrusts.org/~media/assets/2015/11/global_fad_report.pdf?la=en.

items.¹⁶ Therefore, fishermen deploy FADs, which are man-made floating objects typically constructed out of synthetic materials and netting to help congregate fish in one place so that when the fishermen return, numerous fish are easier to catch.¹⁷ Sometimes, FADs are lost or even intentionally left by fishermen; there are no penalties to prevent this behavior.¹⁸ An estimated 81,000 to 121,000 FADs were deployed in 2013, a fourteen-percent increase since 2011.¹⁹

When FADs are lost and left to drift at sea, they can cause damage by unintentionally catching marine life, such as sharks and turtles, in their netting and by washing up on beaches or coral reefs. In spite of all this damage FADs can cause, there is little data about how many FADs are lost in the ocean. However, a study of one particular fishing fleet found close to ten percent of FADs end up beached.²⁰

Of course, some plastic marine debris does come from merchant ships. Traditionally, ships disposed of garbage at sea and that garbage degraded over time.²¹ The shipping industry continued this practice when plastics first started becoming commonplace on ships. For example, in 1982, it was estimated that merchant ships deposited 639,000 plastic containers overboard.²² In order to help change this behavior in the

16. *Id.*

17. *Id.*

18. *Id.*

19. *Id.*

20. Alexandra Maufroy et al., *Large-Scale Examination of Spatio-Temporal Patterns of Drifting Fish Aggregating Devices (dFADs) from Tropical Tuna Fisheries of the Indian and Atlantic Oceans*, 10(5) PLOS ONE E0128023, 1, 16 (2015), <http://journals.plos.org/plosone/article/asset?id=10.1371/journal.pone.0128023.PDF>.

21. Paul E. Hagen, *The International Community Confronts Plastics Pollution from Ships: MARPOL Annex V and the Problem That Won't Go Away*, 5 AM. U. J. INT'L L. & POL'Y 425, 426 (1990); see also *Controlling and Reducing Pollution from Plastic Waste: Hearings before the Subcomm. on Env'tl. Protection of the Comm. on Env't and Pub. Works*, 100th Cong., 1st Sess. 211–12 (statement of Ernest J. Corrado, President, American Institute of Merchant Shipping) (“Historically, commercial merchant vessels have disposed of their garbage at sea in compliance with existing laws Generally, aboard merchant vessels on the high seas, wastes generated as a result of vessel operations and dock maintenance is disposed of directly overboard. Any of these materials which are non-plastic will sink or degrade in a short time.”).

22. Jelena Čulin & Toni Bielić, *Plastic Pollution from Ships*, 51 POMORSKI ZBORNIK 57, 58 (2016), <http://hrcak.srce.hr/file/226169>.

merchant shipping industry, the international community came together through the International Maritime Organization (IMO)—a specialized body of the United Nations responsible for the safety and security of shipping and the prevention of marine pollution from ships—to adopt the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972, commonly known as the London Convention, and the International Convention for the Prevention of Pollution from Ships, known as MARPOL, discussed *infra*.²³ Marine debris is covered under MARPOL's Annex V updates.²⁴

C. *Damage from Plastics in the Marine Environment: Impact on Fish and Marine Mammals*

Plastic marine debris wreaks havoc on the marine environment. A recent review of original publications by marine biologist Richard Thompson of Plymouth University and scientist Sara Gall found that there have been documented encounters between marine debris and 693 different species, with plastic accounting for ninety-two percent of the debris.²⁵ Approximately seventeen percent of the species affected by entanglement were listed as threatened or near-threatened on the International Union for Conservation of Nature's Red List.²⁶ In total, Thompson and Gall “found evidence of 44,000 animals and organisms becoming entangled in, or swallowing debris” from the original reports they reviewed.²⁷ In addition to harm caused directly to animals, floating plastic marine debris may also transport non-native invasive species as the plastic moves through bodies of water.²⁸

While the most visible type of plastic marine debris is larger items, such as plastic bottles or rope, there is another type of serious plastic pollution—microplastics. Microplastics are tiny fragments of plastic defined as being less than five millimeters in

23. *Id.*

24. *See id.* at 61.

25. S.C. Gall & R.C. Thompson, *The Impact of Debris on Marine Life*, 92 MARINE POLLUTION BULL. 170, 172 (2015), <http://www.sciencedirect.com/science/article/pii/S0025326X14008571>.

26. *Id.* at 174.

27. University of Plymouth, *Global impact of debris on marine life studied*, SCIENCE DAILY (Feb. 19, 2015), <https://www.sciencedaily.com/releases/2015/02/150219101643.htm>.

28. THOMPSON ET AL., *supra* note 5, at 10.

diameter, and can range from the size of a virus to the size of an ant.²⁹ Microplastics are either originally manufactured in a small size, such as the small plastic beads found in cosmetic items, which enter the sea through waste streams, or are formed secondarily when large pieces of plastic break down.³⁰ Even washing clothes can contribute to the problem, as synthetic textiles such as fleece shed plastic fibers during washing, indirectly adding considerable numbers of microplastic fibers to marine habitats.³¹

Part of what makes plastics useful—durability—is what directly causes plastics to become a serious problem. Plastics, when they are improperly discarded, remain in a larger polymer form unless a complicated chemical process occurs.³² This chemical process does not usually occur in the aquatic environment.³³ Without that chemical process, plastics do not degrade back into monomers (individual molecules capable of combining).³⁴

In 2014, when marine ecologist Andrés Cózar Cabañas and a team of researchers attempted to map plastic pollution on the surface of the oceans, they found that much of the plastic they expected to find was missing from the surface of the oceans.³⁵ A study by Richard Thompson revealed that the deep-sea floor appears to provide an answer, for he and his team estimated “that every square kilometer of deep ocean contains about four billion plastic fibers—most are two to three centimeters in length and as thin as a human hair.”³⁶

Evidence has shown that marine wildlife, from tiny zooplankton to whales, ingest microplastics, either directly or via

29. Pinya Sarasas et al., *Microplastics: Trouble in the Food Chain*, in UNEP FRONTIERS 2016 REPORT: EMERGING ISSUES OF ENVIRONMENTAL CONCERN 32–33 (Christopher Corbin et al. eds., 2016).

30. *See id.* at 33.

31. *See* Mark Anthony Browne et al., *Accumulation of Microplastic on Shorelines Worldwide [sic]: Sources and Sinks*, 45 ENVTL. SCI. & TECH. 9175, 9177 (2011), <http://pubs.acs.org/doi/abs/10.1021/es201811s>.

32. *See* Sarasas et al., *supra* note 29, at 33.

33. *Id.*

34. *Id.*

35. Laura Parker, *Where Has All the (Sea Trash) Plastic Gone?*, NAT'L GEOGRAPHIC (Dec. 20, 2014), <http://news.nationalgeographic.com/news/2014/12/141218-deep-ocean-micro-plastic-fibers-trash-discovery/>.

36. *Id.*

the food chain.³⁷ One study analyzing the guts of fish sold at markets in Indonesia and California found that over a quarter of them now contain plastic.³⁸ As plastics contain potentially toxic chemicals that are added during their manufacturing, these chemicals may leach into marine organisms.³⁹ Already, chemicals used in plastics have been found in fish, sea mammals, mollusks, and other forms of marine life.⁴⁰ The United Nations Environment Programme (UNEP) states that in high enough concentrations, responses to these chemicals “may include immunotoxicological responses, reproductive disruption, anomalous embryonic development, endocrine disruption, and altered gene expression.”⁴¹

II. U.S. LAWS THAT ADDRESS THIS PROBLEM

A plethora of U.S. laws and international conventions speak to the problem of marine pollution. Many of them form the basis of our environmental regulatory regime. These laws address marine debris from land-based sources and plastics and other garbage dumped into the ocean by ships, etc. For purposes of describing these laws, we have divided them into laws affecting pollution from land-based sources and those affecting pollution from ships.

A. *Pollution from Land-Based Sources*

One of the earliest environmental laws is the Clean Water Act (CWA), which, along with its sister law, the Clean Air Act, was enacted in 1972 and signed into law by President Richard M. Nixon.⁴² The CWA establishes the basic structure for regulating

37. Sarasas et al., *supra* note 29, at 32.

38. Katie Forster, *Microplastics in the sea a growing threat to human health, United Nations warns*, INDEPENDENT (May 21, 2016), <http://www.independent.co.uk/environment/microplastics-microbeads-ocean-sea-serious-health-risks-united-nations-warns-a7041036.html>.

39. See Ian Johnston, *Plastic Should Be Considered Toxic once It Gets into the Environment, MPs Told*, INDEPENDENT (May 3, 2016), <http://www.independent.co.uk/environment/plastic-microplastic-microbeads-pollution-toxic-environment-house-of-commons-environmental-audit-a7011256.html> (stating that plastics contain or are formulated with chemicals that are known to be toxic, and these toxins can enter human food supply through marine food chain).

40. See THOMPSON ET AL., *supra* note 5, at 10.

41. Sarasas et al., *supra* note 29, at 35.

42. The Federal Water Pollution Control Act Amendments of 1972, 33

discharges of pollutants into the waters of the United States and regulating quality standards for surface waters.⁴³ The CWA makes it unlawful to discharge any pollutant from a point source into navigable waters unless a permit is obtained from the Environmental Protection Agency (EPA).⁴⁴ A pollutant is defined to include “dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge . . . chemical wastes, biological materials, radioactive materials . . . and industrial, municipal, and agricultural waste discharged into water. This term does not mean . . . sewage from vessels . . .”⁴⁵ President Nixon, by executive order in 1970, also created both the EPA and NOAA.⁴⁶ It is hard to imagine that a sitting president today would take such action without congressional authorization.

Another important law designed, at least in part, to protect the coastal regions of the United States, including coastal waters, is the Coastal Zone Management Act (CZMA) of 1972.⁴⁷ Under the CZMA, each state is authorized to develop a plan for its coastal zone, broadly defined as coastal waters and adjacent shorelands inland, to control uses that have a direct and significant impact on that zone.⁴⁸ If the state’s plan is approved by the NOAA, the state becomes entitled to federal grants.⁴⁹ The CZMA also provides enhancement grants if states develop plans either to reduce marine debris entering the nation’s coastal and ocean environments or for the use of ocean resources for waters within the territorial sea of the states.⁵⁰ Furthermore, “[t]he CZMA requires that between ten and twenty percent of the

U.S.C.A. §§ 1251–1387 (Westlaw through Pub. L. No. 114-244); Robin Madel, *Nixon’s Clean Water Act Impoundment Power Play*, THE HUFFINGTON POST (Mar. 22, 2012, 3:53 PM), http://www.huffingtonpost.com/robin-madel/nixons-clean-water-act-im_b_1372740.html.

43. See, e.g., 33 U.S.C.A. §§ 1251(a), 1252(a) (Westlaw).

44. *Id.* § 1312(a), (b)(2) (Westlaw).

45. *Id.* § 1362(6) (Westlaw).

46. Reorganization Plan No. 3 of 1970, 3 C.F.R. 1072 (1966–1970), *reprinted in* 5 U.S.C. app. at 698 (2012), *and in* 84 Stat. 2086 (1970) (establishing the Environmental Protection Agency); Reorganization Plan No. 4 of 1970, 3 C.F.R. § 1075 (1966–1970), *reprinted in* 5 U.S.C. app. at 703 (2012), *and in* 84 Stat. 2090 (1970) (establishing the National Oceanic and Atmospheric Administration within the Department of Commerce).

47. Coastal Zone Management Act of 1972, 16 U.S.C.A. §§ 1451–1466 (Westlaw through Pub. L. No. 114-244).

48. *Id.* §§ 1451(i), 1453(1) (Westlaw).

49. See *id.* § 1455 (Westlaw).

50. See *id.* § 1456b(a) (Westlaw).

Section 306/309 appropriation be directed towards Section 309 [ocean planning], up to a maximum of \$10,000,000.”⁵¹ A few states have undertaken this ocean-planning process, notably Rhode Island, Oregon, Washington, and California.⁵² Except for having the power of the purse, the CZMA does not grant the NOAA any other enforcement tools.

The Shore Protection Act of 1988 was enacted as Title IV of the Ocean Dumping Ban Act of 1988.⁵³ The Shore Protection Act prohibits the transportation of municipal or commercial waste within coastal waters by a vessel without a permit and other markings required by the Secretary of Commerce.⁵⁴ Permits are not to run beyond renewable five-year terms and will terminate when the vessel is sold.⁵⁵ Under the Shore Protection Act, the EPA, in consultation with the Coast Guard, is responsible for developing “regulations to minimize [the] deposit of waste into coastal waters during vessel loading, transport, and unloading, and to ensure the deposited waste is reported and cleaned up.”⁵⁶

The Beaches Environmental Assessment and Coastal Health (BEACH) Act was signed into law on October 10, 2000.⁵⁷ The BEACH Act amends the CWA and requires the EPA to develop performance criteria for testing, monitoring, and notifying public users of possible coastal recreation water problems.⁵⁸

51. Memorandum from Joelle Gore, Chief, National Oceanic and Atmospheric Administration, Stewardship Division, to Commonwealth, State, and Territorial Coastal Program Managers (Apr. 7, 2016), <https://coast.noaa.gov/czm/media/fy16finalguidance.pdf>.

52. See Cynthia Drummond, *R.I. Plays Key Role in Nation's First Ocean Plan*, THE WESTERLY SUN (Nov. 3, 2016, 9:13 PM), <http://www.thewesterlysun.com/news/stonington/9547969-154/ri-plays-key-role-in-nations-first-ocean-plan.html>; *West Coast Regional Planning Body*, WEST COAST MARINE PLANNING, <http://www.westcoastmarineplanning.org/> (last visited Nov. 11, 2016).

53. The Shore Protection from Municipal or Commercial Waste Act, 33 U.S.C.A. §§ 2601–2609, 2621–2623 (Westlaw through Pub. L. No. 114-244); see also *Summary of the Shore Protection Act*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/laws-regulations/summary-shore-protection-act> (last visited Nov. 12, 2016).

54. § 2602(a) (Westlaw).

55. *Id.* § 2602(c)(2) (Westlaw).

56. *Summary of the Shore Protection Act*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/laws-regulations/summary-shore-protection-act> (last updated Jan. 6, 2016).

57. Beaches Environmental Assessment and Coastal Health (BEACH) Act of 2000, Pub. L. No. 106-284, 114 Stat. 870 (2000).

58. *About the BEACH Act*, U.S. ENVTL. PROTECTION AGENCY,

Additionally, the BEACH Act requires states, territories, and tribes that have coastal recreation waters to adopt new or revised water quality standards; requires the EPA to conduct studies associated with pathogens and human health; and authorizes the EPA to award grants to states, territories, tribes, or local governments to develop and implement beach monitoring and assessment programs.⁵⁹ Thus, the focus of the BEACH Act is on water quality, not necessarily marine debris. The EPA has awarded nearly \$149 million in grants to eligible coastal and Great Lakes states, territories, and tribes for beach monitoring and notification programs since 2002.⁶⁰

While the EPA does not define pathogens to include plastics,⁶¹ certainly the BEACH Act could be expanded to include plastics in order to ensure that plastics do not interfere with recreational pleasures of beach-goers, who should themselves be encouraged to pick up marine debris along the beach.

In 2006, Congress passed the Marine Debris Research, Prevention and Reduction Act to specifically address marine debris.⁶² The law had two critical purposes: “(1) to help identify, determine sources of, assess, reduce, and prevent marine debris and its adverse impacts on the marine environment and navigation safety; [and (2)] to develop a federal marine debris information clearinghouse.”⁶³ The NOAA and the Coast Guard share responsibility for implementing the Act.⁶⁴ The NOAA administrators conduct public education and outreach to the public sector and marine industries, including the fishing industry, and have the authority to enter into cooperative agreements and grants to carry out the law.⁶⁵ The expected

<http://www.epa.gov/beach-tech/about-beach-act> (last updated Jan. 10, 2016).

59. *Id.*

60. *Beach Grants*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/beach-tech/beach-grants> (last updated July 27, 2016).

61. Pathogens are microbial organisms, such as bacteria and viruses, which can make people ill. *Microbial (Pathogen)/Recreational Water Criteria*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/wqc/microbial-pathogenrecreational-water-quality-criteria> (last updated July 21, 2016).

62. Marine Debris Research, Prevention, and Reduction Act, Pub. L. No. 109-449, 120 Stat. 3333 (2006) (codified at 33 U.S.C. §§ 1951–58 (2006)).

63. *Id.* § 2.

64. 33 U.S.C.A. §§ 1952(a), 1953(5)–(6) (Westlaw through Pub. L. No. 114-229).

65. *Id.* § 1952(b)(2)–(4) (Westlaw), § 1956(1) (Westlaw through Pub. L.

funding available for the 2016 fiscal year for community-based, marine-debris-removal grants is \$2 million, with awards typically ranging from \$50,000 to \$150,000.⁶⁶

The Commandant of the Coast Guard is directed by the Marine Debris, Research, Prevention, and Reduction Act to “take actions to reduce violations of MARPOL Annex V and the Act to Prevent Pollution from Ships” (APPS), described below, and to develop and implement a plan to improve ship-board waste management and port compliance, also described below.⁶⁷ Whereas the Coast Guard has enforcement authority under MARPOL and APPS, the NOAA lacks any authority to enforce its responsibilities other than through awarding grants and cooperative agreements.⁶⁸ As noted above, funding for the community grants is quite modest.

In 2012, Congress amended the Marine Debris Act by striking the words “prevention and removal” from the title of the NOAA’s Marine Debris Program, focusing the law on identifying sources of marine debris.⁶⁹ However, the NOAA still lacked authority to enforce the law and funding has been limited.

B. *Pollution from Ships and Other Marine Sources*

Since shipping is clearly an international activity that crosses national and oceanic boundaries, it is not surprising that the international community has developed a series of regulations governing the shipping industry, and that the IMO, headquartered in London, is responsible for developing these uniform regulations.⁷⁰

The preeminent international regime governing all manner of ocean pollution, including oil, sewage, and plastic garbage, is

No. 114-244).

66. *FY2016 Community-based Marine Debris Removal*, FED. GRANTS, www.federalgrants.com/FY2016-Community-based-Marine-Debris-Removal-53172.html (last visited Feb. 6, 2017).

67. § 1953(1), (4) (Westlaw).

68. *Id.* § 1952 (Westlaw).

69. Coast Guard and Maritime Transportation Act of 2012, H.R. Res 825, 112 Cong. § 604(a) (2012).

70. *Introduction to IMO*, INT’L MAR. ORG., <http://www.imo.org/en/About/Pages/Default.aspx> (last visited Feb. 6, 2017); *30 Years at Albert Embankment: 1983–2013*, INT’L MAR. ORG., <http://www.imo.org/en/About/HistoryOfIMO/Documents/30%20years%20at%20IMO%20HQ.pdf> (last visited Feb. 6, 2017).

MARPOL.⁷¹ MARPOL was preceded in 1972 by the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, called the London Dumping Convention.⁷² The MARPOL Convention contains a series of annexes devoted to each form of marine pollution.⁷³ Annex I contains regulations for the prevention of pollution by oil; Annex II regulates pollution by noxious liquid substances in bulk; Annex III contains regulations for the prevention of pollution by harmful substances carried by sea in packaged forms; Annex IV regulates pollution by sewage from ships; Annex V regulates the prevention of pollution by garbage from ships; and Annex VI addresses air emissions.⁷⁴

For this Article, the most relevant Annexes are IV and V. The United States has not technically ratified Annex IV because they have equivalent regulations for the treatment and discharge standards of shipboard sewage found in the CWA and implementing regulations at 33 C.F.R. § 159.⁷⁵ Except for Annex IV, the United States has ratified MARPOL and the London Dumping Convention and has implemented them through a domestic legal and regulatory regime.

Domestically, the London Dumping Convention is implemented by the Marine Protection, Research and Sanctuaries Act (MPRSA).⁷⁶ And MARPOL is implemented by the APPS.⁷⁷ Title I of the MPRSA, entitled the Ocean Dumping Act, generally

71. Protocol Relating to Intervention on the High Seas in Cases of Pollution by Substances Other Than Oil art. 1, Nov. 2, 1973, 34.3 U.S.T. 3407, 1340 U.N.T.S. 184.

72. Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Dec. 29, 1972, 26 U.S.T. 2403. The London Dumping Convention was updated in 1996 by the London Protocol which entered into force in 2006. *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter*, INT'L MAR. ORG., <http://www.imo.org/en/OurWork/Environment/LCLP/Pages/default.aspx> (last visited Feb. 6, 2017). The U.S. has signed but not ratified the London Protocol. *Ocean Dumping: International Treaties*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/ocean-dumping/ocean-dumping-international-treaties#US%20LC%20Contracting%20Party> (last updated Jan. 4, 2017).

73. United States Coast Guard, Office of Commercial Vessel Compliance, *International Convention for the Prevention of Pollution from Ships—MARPOL 73/78*, U.S. DEP'T OF HOMELAND SEC., <https://www.uscg.mil/hq/cgcvl/cvc/marpol.asp> (last modified Jan. 11, 2017).

74. *Id.*

75. *Id.*; see also 33 C.F.R. § 159 (Westlaw through Feb. 2, 2017).

76. 33 U.S.C.A. § 1401–1445 (Westlaw through Pub. L. No. 114-254).

77. *Id.* § 1905–1915 (Westlaw).

prohibits (1) transporting material from anywhere for the purpose of ocean dumping;⁷⁸ (2) transporting material from anywhere for the purpose of ocean dumping by U.S. agencies or U.S.-flagged vessels;⁷⁹ and (3) dumping material that was transported from outside the United States into the U.S. territorial sea.⁸⁰ For one to deviate from these prohibitions, a permit from the EPA is required.⁸¹

Prior to 1972, material was dumped into the ocean in vast amounts. For instance, in 1970, a report to the President from the Council on Environmental Quality described that, in 1968, 38 million tons of dredged material (thirty-four percent of which was polluted), 4.5 million tons of industrial waste, 4.5 million tons of sewage sludge (significantly contaminated with heavy metals), and 0.5 million tons of construction and demolition debris were dumped into the oceans surrounding the United States.⁸² It is no wonder Congress passed the Ocean Dumping Act in 1972. Since the passage of the Ocean Dumping Act, both public and private vessels have dramatically reduced the amount of waste that is directly dumped into the sea.⁸³

According to the EPA, “[t]oday, the United States is at the forefront of protecting coastal and ocean waters from adverse impacts due to ocean dumping. The ocean is no longer considered an appropriate disposal location for most wastes.”⁸⁴ Nevertheless, although direct ocean dumping is primarily limited to clean dredge disposal, marine debris—especially plastics—are still entering the ocean, posing a serious, and potentially worsening, problem.

In 1988, Congress amended the Ocean Dumping Act to ban the dumping of sewage, sludge, or industrial waste into ocean waters after December 31, 1991.⁸⁵ The Ocean Dumping Ban Act

78. *Id.* § 1411(a)(2) (Westlaw).

79. *Id.* (Westlaw)

80. *Id.* § 1401(c) (Westlaw).

81. 40 C.F.R. § 220.3(a) (Westlaw through Feb. 2, 2017).

82. COUNCIL ON ENVTL. QUALITY, SE 012 592, REPORT TO THE PRESIDENT, OCEAN DUMPING: A NATIONAL POLICY (1970); *Learn About Ocean Dumping*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/ocean-dumping/learn-about-ocean-dumping#MPRSA> (last updated Feb. 1, 2017).

83. *Learn About Ocean Dumping*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/ocean-dumping/learn-about-ocean-dumping#MPRSA> (last updated Feb. 1, 2017).

84. *Id.*

85. Ocean Dumping Ban Act of 1988, Pub. L. No. 100-688, § 104B, 102

also prohibits “public vessels” from disposing potentially infectious medical waste into ocean waters.⁸⁶

The APPS was amended in 1987 to implement MARPOL, including Protocols I and II as well as Annexes I, II, and V.⁸⁷ The amendments strengthened the Coast Guard’s authority to enforce the APPS by extending its application to all ships entering U.S. waters.⁸⁸ Today, the APPS requires ships to have certificates of compliance, without which they could be detained until it is determined that the ship poses no “unreasonable threat of harm to the marine environment or the public health and welfare.”⁸⁹ The APPS also authorizes payments to whistleblowers who provide information leading to convictions or assessments of fines;⁹⁰ requires ships to maintain onboard refuse record books and shipboard management plans;⁹¹ and requires ships to display placards notifying the crew and passengers of the requirements of Annex V to the MARPOL Convention and of Annex IV to the Antarctic Protocol.⁹² In conjunction with the APPS, the Coast Guard established regulations, including criteria for determining the adequacy of port and terminal receptacle facilities for garbage, oil, and noxious liquid substances, and those terminals must bear certificates demonstrating compliance.⁹³ The Coast Guard was also granted enforcement authority under which violators are subject to both civil and criminal penalties.⁹⁴

The “whistleblower provision” has led to numerous convictions, penalties, and awards. According to Marine Defenders, more than half of the current MARPOL cases have arisen from crew members alerting U.S. authorities about illegal discharges or false records.⁹⁵ The rewards have ranged from

Stat. 4139 (1988) (codified as amended at 33 U.S.C. § 1414b(a)(1)(A) (2015)).

86. United States Public Vessel Medical Waste Anti-Dumping Act of 1988, Pub. L. No. 100-688, tit. III, §§ 3102, 3104, 102 Stat. 4152 (1988) (codified as amended at 33 U.S.C. §§ 2501, 2503 (2015)).

87. Act to Prevent Pollution from Ships, Pub. L. No. 100-220, tit. II, § 2101, 101 Stat. 1460 (1987) (codified as amended at 33 U.S.C.A § 1901 (Westlaw through Pub. L. No. 114-254)).

88. 33 U.S.C.A § 1902 (Westlaw).

89. *Id.* § 1904(a), (e) (Westlaw).

90. *Id.* § 1908(b)(2) (Westlaw).

91. *Id.* § 1903(c)(4)(A)(i) (Westlaw).

92. *Id.* (Westlaw)

93. *Id.* § 1905(a)(1), (c)(1) (Westlaw).

94. *Id.* §§ 1903(a), 1908(a)–(b) (Westlaw).

95. *Rewards for Whistleblowers*, MARINE DEFENDERS, <http://www>.

\$40,000 to \$400,000.⁹⁶ One can debate the negative policy implications that stem from encouraging crew members to “snitch” on their officers, but, in light of the scarce resources allocated to the Coast Guard, such incentives are probably necessary for proper execution of MARPOL. As explained below, most responsible shipping companies have a compliance protocol in place.

The Marine Plastic Pollution Research and Control Act (MPPRCA) also charged the Administrator of the EPA, in consultation with the Secretary of Commerce, to study the adverse environmental effects of improper disposal of plastic articles and waste, as well as the various methods to reduce or eliminate such effects.⁹⁷ The MPPRCA directed the Secretary of Commerce to submit a report to Congress on the effects of plastic materials on the marine environment.⁹⁸ Finally, the MPPRCA authorized the Administrator of the NOAA and the Administrator of the EPA to jointly commence and conduct “a public outreach program to educate the public[,] . . . including recreational boaters, fishermen, and other users of the marine environment[,] [on] . . . the harmful effects of plastic pollution . . . [and] the need to reduce such pollution[,] . . . to recycle plastic materials, and . . . to reduce the quantity of plastic debris in the marine environment.”⁹⁹

This public outreach program is where the North American Marine Environment Protection Association (NAMEPA) has significantly partnered with the NOAA to create a robust marine debris program. Beginning with its marine debris poster, NAMEPA has also developed *An Educator’s Guide to Marine Debris*, which is targeted for students in kindergarten through the twelfth grade. This program educates students on the dangers of marine debris to our planet as well as provides constructive suggestions on how they can develop solutions.¹⁰⁰ NAMEPA also partners with Ocean Conservancy on its International Coastal Cleanup Day, which weighs and catalogs marine debris for

marinedefenders.com/commercial/rewards.php (last visited Mar. 13, 2017).

96. *Id.*

97. § 1952 (a)–(b) (Westlaw).

98. *See* United States-Japan Fishery Agreement Approval Act of 1987, Pub. L. No. 100-220, § 2203, 101 Stat. 1458, 1466 (1987).

99. *Id.* § 2204, 101 Stat. at 1446–47.

100. *An Educator’s Guide to Marine Debris*, NORTH AM. MARINE ENV’T PROTECTION ASS’N (2014), <https://marinedebris.noaa.gov/sites/default/files/publications-files/NAMEPALearningGuideFinal.pdf>.

submission to a summary document that is presented to the United Nations.¹⁰¹

Finally, Annex VI, in the amendments adopted in 2010 to MARPOL, created a system of special areas, called Emission Control Areas (ECAs) in which, due to their oceanographic and ecological conduction, including heavy maritime traffic, special mandatory methods for the prevention of marine pollution by garbage were adopted and required.¹⁰² The United States has requested and designated two areas as ECAs: the North American ECA and the U.S. Caribbean ECA.¹⁰³ In these ECAs, the EPA has established higher emission standards by requiring ships to use low sulfur fuels.¹⁰⁴ Why not add marine debris to the category of prohibited uses within an ECA?

Other special areas under the IMO are known as Particularly Sensitive Sea Areas (PSSAs), which warrant special protection through action of the IMO after it recognizes significant ecological, socioeconomic, or scientific attributes that might make these areas vulnerable due to international shipping activities.¹⁰⁵ When a PSSA is adopted by the IMO, an appropriate protective measure designed to prevent, reduce, or eliminate the threat may also be

101. *30th Anniversary: International Coastal Cleanup*, OCEAN CONSERVANCY (2015), <http://www.oceanconservancy.org/our-work/marine-debris/2016-data-release/2016-data-release-1.pdf>.

102. *Prevention of Pollution by Garbage from Ships*, INT'L MAR. ORG., <http://www.imo.org/en/OurWork/Environment/PollutionPrevention/Garbage/Pages/Default.aspx> (last visited Feb. 10, 2017).

103. *Designation of the North American Emission Control Area for Marine Vessels*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/regulations-emissions-vehicles-and-engines/designation-north-american-emission-control-area-marine> (last visited Feb. 10, 2017); *Designation of the U.S. Caribbean Emission Control Area for Marine Vessels*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/regulations-emissions-vehicles-and-engines/designation-us-caribbean-emission-control-area-marine> (last visited Feb. 10, 2017).

104. Amendments Related to: Tier 3 Motor Vehicle Emission and Fuel Standards, Nonroad Engine and Equipment Programs, and MARPOL Annex VI Implementation, 80 Fed. Reg. 9078-01 (Feb. 19, 2015) (to be codified at 40 C.F.R. pts. 59, 80, 85, *et al.*).

105. Int'l Mar. Org., *Revised Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas*, Assembly Res. A.982(24), (Dec. 1, 2005) (updating IMO, *Guidelines for the Identification of Special Areas and the Identification of Particularly Sensitive Sea Areas*, Assembly Res. A.720(17), (Nov. 6, 1991)). The thirteen current PSSAs, including the Papahānaumokuākea Marine National Monument and the sea surrounding the Florida Keys in the United States, as well as their associated measures, can be explored at www.pssa.imo.org.

adopted. Any associated protective measures must have been approved by the IMO in a legal text.¹⁰⁶ Some examples of associate protective measures include routing measures such as “Areas to be Avoided,” installations of “Vessel Traffic Services,” or strict application of MARPOL measures.¹⁰⁷

C. *How are These Laws Working?*

Congress has certainly done its part by enacting a series of laws affecting and trying to reduce marine pollution, especially from plastics. But, taking a look at the figures cited in the previous section, a skeptic would come to the conclusion that the laws are working to address direct dumping of garbage and other waste into the marine environment, but they are not tackling the real problems, such as the amount of plastic in use keeps growing, plastic is not easily recycled, and we are a disposable society—today’s package from Amazon may go into the recycle or garbage bin, but once it is out of sight, it is out of the consumer’s mind.

Our initial conclusion is that the laws are working fairly well, and they do cover the waterfront of land-based and marine sources of pollution, but our society is so dependent on plastics, which are increasing at such a rapid pace, that the laws cannot keep up with the problem. It is often just too convenient to dump our garbage on land and into the ocean without thinking of the consequences for our marine environment. It is this lassitude that our policymakers must address. We will come to a final conclusion about needed changes to our current laws in the final section of this Article, and make certain recommendations for improving these laws.

III. ROLE OF THE SHIPPING INDUSTRY AND PORTS TO PREVENT MARINE DEBRIS ENTERING THE OCEAN

A. *Examples of Shipping Industry Actions to Comply with Annex V and Beyond*

Since the enactment of MARPOL Annex V, the shipping industry has made significant progress in reducing garbage from

106. *Id.*

107. *Particularly Sensitive Sea Areas*, INT’L MAR. ORG., <http://www.imo.org/en/OurWork/Environment/PSSAs/Pages/Default.aspx> (last visited Feb. 10, 2017).

entering the ocean from ships covered by MARPOL. The cruise lines have adopted a policy of Waste Management Best Practices and Procedures through the trade association Cruise Lines International Association.¹⁰⁸ Most major shipping companies have their own policies and systems that address waste from ships as well. For example, Maersk created group policies responding to applicable laws and regulations. Maersk's response means they will provide training and support for employees, monitor their compliance, and cooperate with public authorities in the case of an investigation.¹⁰⁹

Classification societies—nongovernmental organizations that audit ships on behalf of flag states—have been in the forefront of promoting environmental compliance. For example, Lloyd's Register awards an ECO Class Notation, a voluntary set of rules for environmental ship design, construction, and operation.¹¹⁰ Lloyd's Register also issues Statement of Conformance for MARPOL 73/78 Annex V, and provides their members thorough MARPOL compliance guidance.¹¹¹ Another classification society—DNV GL—also provides MARPOL survey, advice, and certification services.¹¹²

Unfortunately, when a vessel is at sea, little can be done in terms of enforcement of Annex V regulations. For instance, while a "Garbage Record Book" is required to be maintained,¹¹³ the entries are self-reported and independent verification is difficult. Therefore, noncompliance from inadequate verification is widespread. One report suggested that on some ships plastic is

108. *Waste Management*, CRUISE LINES INT'L ASS'N, <http://www.cruising.org/about-the-industry/regulatory/industry-policies/environmental-protection/waste-management> (last visited Jan. 5, 2017).

109. *The Maersk Group's Group Policies*, MAERSK, <http://www.maersk.com/en/the-maerskgroup/~media/6a47fc2e891640a59c6b56a22bea5f49.ashx> (last visited Jan. 5, 2017).

110. *ECO Notation*, LLOYD'S REGISTER, <http://www.lr.org/en/services/environment-and-sustainability/ECOnotation.aspx> (last visited Jan. 5, 2017).

111. *MARPOL*, LLOYD'S REGISTER, <http://www.lr.org/en/marine/operation/standards-schemes-codes-and-directives/marpol.aspx> (last visited Jan. 5, 2017).

112. *MARPOL survey and certification service, advice*, DNV GL, <https://www.dnvgl.com/services/marpol-survey-and-certification-service-advice-4360> (last visited Jan. 5, 2017).

113. *Prevention of Pollution by Garbage from Ships*, INT'L MAR. ORG., <http://www.imo.org/en/OurWork/environment/pollutionprevention/garbage/Pages/Default.aspx> (last visited Jan. 5, 2017).

intentionally shredded so that it may be disguised as food waste and discharged.¹¹⁴ Another study, published in 1997, estimated ships still discarded 6.5 million tons per year of plastics.¹¹⁵ Recently, a European research organization estimated 1.75 million tons of plastic marine debris originates from ships, 600,000 tons per year from merchant shipping vessels, and 1,150,000 tons per year from fishing vessels.¹¹⁶ While this is certainly a decrease from previous estimates, the figure still represents a significant amount of plastic marine debris. The United States highly encourages whistleblowers to report MARPOL and APPS violations by providing lucrative rewards—as much as fifty percent of any penalty paid. This seems to be working; in 2011, it was reported that more than fifty percent of cases brought to the attention of government officials came from whistleblowers.¹¹⁷

B. Port Recycling Programs

MARPOL also requires that ports do their part to help dispose of the garbage when ships pull into them.¹¹⁸ Despite requirements, ports in developing states often may lack the necessary waste reception facilities. At least one study has found that this correlates to increased dumping of wastes by ships at sea.¹¹⁹ For example, one report found that in the area of Haiti “[seventy to eighty percent] of marine debris originates from shipping traffic in the region.”¹²⁰ The 2014 Regional Action Plan on Marine Litter Management for the Wider Caribbean Region

114. David K. A. Barnes et al., *Accumulation and Fragmentation of Plastic Debris in Global Environments*, 364 ROYAL SOC’Y PUBL’G PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOC’Y B 1985, 1994 (2009).

115. Derraik, *supra* note 3, at 848.

116. *Plastics in the Marine Environment*, EUNOMIA, <http://www.eunomia.co.uk/reports-tools/plastics-in-the-marine-environment/> (last visited Feb. 5, 2017).

117. Jeanne M. Grasso & Gregory F. Linsin, *MARPOL Enforcement in the United States*, BLANK ROME (May 2011), <https://www.blankrome.com/index.cfm?contentID=37&itemID=2471>.

118. See International Convention for the Prevention of Pollution from Ships, Nov. 2, 1973, 1340 U.N.T.S. 184, as amended by Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships, 1973, Feb. 17, 1978, 1340 U.N.T.S. 61 app. IV.

119. *Solid Waste and Marine Litter*, UNITED NATIONS ENV’T PROGRAMME, <http://www.cep.unep.org/publications-and-resources/marine-and-coastal-issues-links/solid-waste-and-marine-litter> (last visited Jan. 5, 2017).

120. *Id.*

recommended that “[a] survey of the adequacy of existing Port Reception Facilities of all the countries of the [Wider Caribbean Region] is necessary to identify priority areas for improvement.”¹²¹ The same report recognized that enforcement of legislation related to marine pollution has always been an issue, and emphasized the importance of “adequate institutional mechanisms for enforcing national laws,” and noted that “a sense of environmental stewardship among ocean users [was] essential for these law to be effective.”¹²² This is where amending the Caribbean ECA could come into play.

The IMO maintains a database of information on the available port reception facilities for the delivery of ship-generated waste, as provided by the IMO member states.¹²³ The database is free and available to the public. The database also contains a list of alleged inadequacies that have been reported by flag states of visiting vessels.¹²⁴ At this time, the list of alleged inadequacies of ports for which data has been populated by the member states stands at 453 (460 in the IMO database),¹²⁵ but is limited to those vessels that file reports. Some vessel operators are unwilling to report inadequacies.

IV. ROLE OF NAMEPA IN PREVENTION OF MARINE DEBRIS

A. *Who is NAMEPA?*

NAMEPA is an industry-led, nonprofit association of environmental stewards with the mission to “Save our Seas.”¹²⁶ NAMEPA works to liaise between the conservation community and the maritime industry, helping to balance commerce and conservation.¹²⁷ NAMEPA accomplishes this by engaging industry, regulators, and conservation groups in dialogue to

121. Regional Action Plan on Marine Litter Management (RAPMaLi) for the Wider Caribbean Region, UNITED NATIONS ENV'T PROGRAMME 1, 32 (2014), <https://www.cbd.int/doc/meetings/mar/mcbem-2014-03/other/mcbem-2014-03-115-en.pdf>.

122. *Id.* at 34.

123. *Reported Cases of Alleged Inadequacies of Reception Facilities and the Follow-up Response by Port States*, INT'L MAR. ORG., <http://gis.imo.org/Public/PRF/ReportedCases.aspx> (last visited Jan. 5, 2017).

124. *Id.*

125. *Id.*

126. *Our Mission*, NORTH AM. MARINE ENV'T PROTECTION ASS'N, <http://www.namepa.net> (last visited Jan. 5, 2017).

127. *Id.*

discuss strategies to protect the marine environment.¹²⁸ NAMEPA also helps spread the word about the importance of the marine environment and the need to protect it by educating students, seafarers, and port communities on this important issue.¹²⁹

NAMEPA has been in existence since 2007, and its members, known to be responsible stewards of our marine environment, come from all over North America as well as Europe.¹³⁰ Throughout the year, NAMEPA hosts conferences, speaker series, and seminars designed to educate the marine industry about the importance of marine conservation.¹³¹ Since its inception, NAMEPA has partnered with the U.S. Coast Guard and its Auxiliary, NOAA, Mystic Aquarium, Transport Canada, Chamber of Shipping of America, the American Salvage Association, the Houston Maritime Museum, Ocean Conservancy, and the U.S. Power Squadron.¹³²

B. *Beach and Marina Cleanup Projects*

NAMEPA, and those educated by NAMEPA, participate in beach and marina cleanups year-round all over North America. NAMEPA itself hosts and participates in over two dozen beach cleanups every year, and provides beach cleanup participants with a Beach Cleanup Toolkit, which includes items needed for a safe beach cleanup.¹³³

NAMEPA, in partnership with Ocean Conservancy, annually holds events on both International Marina Cleanup Day and International Coastal Cleanup Day. Participants are asked to catalogue the type of debris they collect either by filling out a simple form provided by Ocean Conservancy or by using Ocean Conservancy's mobile application. Ocean Conservancy uses this

128. *Id.*

129. *Education*, NORTH AM. MARINE ENV'T PROTECTION ASS'N, <http://www.namepa.net/education/> (last visited Jan. 5, 2017).

130. *Members*, NORTH AM. MARINE ENV'T PROTECTION ASS'N, <http://www.namepa.net/members/> (last visited Jan. 5, 2017).

131. *Upcoming Events*, NORTH AM. MARINE ENV'T PROTECTION ASS'N, <http://www.namepa.net/upcoming-events/> (last visited Jan. 5, 2017).

132. *Partners*, NORTH AM. MARINE ENV'T PROTECTION ASS'N, <http://www.namepa.net/partners/> (last visited Jan. 5, 2017).

133. *Beach Clean Up Tool Kit*, NORTH AM. MARINE ENV'T PROTECTION ASS'N JUNIOR, <http://www.namepajr.net/beach-clean-up/> (last visited Jan. 5, 2017).

data to create and publish *The Ocean Trash Index* on an annual basis, which provides a state-by-state and country-by-country snapshot of the trash in our oceans and on our shores.¹³⁴ The data is used to help identify debris hot spots and create solutions to keep our oceans and coastlines free of debris.¹³⁵

C. *Educational Tools*

NAMEPA has developed numerous tools to help educate individuals about the need to “save our seas,” which are individually tailored to educators, seafarers, students, or communities throughout North America. For educators, NAMEPA’s materials include three educators’ guides: *An Educator’s Guide to the Marine Environment*; *An Educator’s Guide to Marine Debris*, which includes PowerPoint presentation lessons on marine debris; and, coming soon, *An Educator’s Guide to the Marine Industry*.¹³⁶ These educators’ guides provide background and activities for students of all different ages and help them get to know the marine environment and the importance of protecting it, as well as provide insight into careers in the marine industry. NAMEPA has also published an activity guide for children, *Exploring the Marine Environment, Activities and Games for Kids of All Ages*.¹³⁷ NAMEPA utilizes the tools itself when visiting schools and camps throughout North America, giving presentations to students from pre-kindergarten to high school. NAMEPA also holds an art contest for students of all ages every year and prints a Sustainable Seas Calendar, which highlights some of the favorite entries.

In addition, students can set up NAMEPA Campus Chapters at their schools and a toolkit is provided to help facilitate their implementation. NAMEPA now has Campus Chapters all around North America, including at several of the maritime universities. Many members of these Campus Chapters have interned for NAMEPA during their time in high school and university.

NAMEPA’s mission is to connect students, seafarers, and

134. *International Coastal Cleanup: 2015 Ocean Trash Index*, OCEAN CONSERVANCY, <http://www.oceanconservancy.org/our-work/international-coastal-cleanup/2015-ocean-trash-index.html> (last visited Jan. 5, 2017).

135. *Id.*

136. *Education*, NORTH AM. MARINE ENV’T PROTECTION ASS’N, <http://www.namepa.net/education/> (last visited Jan. 5, 2017).

137. *Id.*

communities to the marine environment. When students learn at a young age how their actions, which may seem far from the ocean, can affect the marine environment, they will develop behaviors that will lead them to be more responsible ocean stewards in the future. Regarding seafarers, NAMEPA helps seafarers from around the world understand that when they are out to sea, their actions are still not out of mind. To this end, NAMEPA has produced the *MARPOL Learning Guide*, outlining the risks of pollution and the regulations designed to protect the sea.¹³⁸ In port communities, NAMEPA helps connect the community to the port in an effort to open communication between the port and local community.

V. CONCLUSIONS AND RECOMMENDATIONS

While the “enemy is us,” it is also up to us to address this growing problem of marine debris in the marine environment, including plastics. We recommend the following twelve-point plan of action:

1. Establish a better-funded public outreach campaign administered by the EPA and NOAA with support from the public and private sectors, including organizations such as NAMEPA.
2. Increase penalties for improper land-based disposal of plastics by amending the CWA and MPPRCA.
3. Build industry and public coalitions to tackle the problem of plastic marine debris.
4. Establish a program of awards and recognition for cleanup campaigns and champions, similar to the EPA Energy Star program, and create beach-sponsorship programs.
5. Set a goal to reduce plastic in the manufacturing sector by fifty percent by 2030, phased in over the next fifteen years.
6. Fund research on a plastic that will degrade or can be

138. See *Turning the Tide on Trash: A Learning Guide on Marine Debris*, NORTH AM. MARINE ENV'T PROTECTION ASS'N, https://static1.squarespace.com/static/5499bdeee4b0385fffdc1d4f/t/54aae9abe4b017b15a9589c5/1420487083268/TurningTideonTrash_Final.pdf (last visited Mar. 16, 2017); *Other Resources*, NORTH AM. MARINE ENV'T PROTECTION ASS'N, <http://www.namepa.net/other-resources/> (last visited Mar. 16, 2017).

- recycled.
7. Amend the CWA to include marine debris as a regulated pollutant.
 8. Amend the BEACH Act to include plastics and other forms of marine debris.
 9. Expand the scope of U.S. regulations for ECAs to include plastics and marine debris, and recommend the same to the IMO, as well as identify PSSAs where the most stringent regulations available under MARPOL for preventing the dumping of plastic and marine debris should be applied.
 10. Increase funding for the EPA and NOAA marine debris programs.
 11. Manage plastics with a life-cycle approach, including during the manufacturing process, and provide incentives to increase the number of port-waste reception facilities and waste recycling programs.
 12. Support the establishment of registration and license requirements for FADs, and hold fishing vessels accountable for the retrieval of the FADs they deploy.