

Plastic Debris Rivers to Seas Conference September 7-9, 2005

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"Beach Debris – Characterized through the International Coastal Cleanup & the U.S. National Marine Debris Monitoring Program"

Introduction:

Marine debris is one of the most pervasive and *solvable* pollution problems plaguing the world's oceans and waterways. Successful management of the problem requires a comprehensive understanding of the pollution problem including what are the types of marine debris, their abundance and sources, and most importantly, the human behavior producing it. Effective documentation and monitoring activities to assess the types and amounts of debris, combined with public education programs, effective policies supported by national and local legislation, and governmental and private compliance and enforcement form the foundation for a successful marine pollution prevention initiative that can lead to the abatement of the marine debris problem impacting every major body of water on the planet.

Scientists define *marine debris* as any manufactured or processed solid waste material (typically inert) that enters the ocean environment from any source (Coe & Rogers, 1997). Debris is more than an unsightly inconvenience for beach-bound vacationers or pleasure boaters; it's one of the world's most pervasive pollution problems affecting our oceans and inland waterways. It affects the economies and inhabitants of coastal and waterside communities worldwide. Over the past 40 years, organic materials (once the most common forms of debris) have yielded to synthetic elements as the most abundant material in solid waste. Durable and slow to degrade, plastic materials that are used in the production of containers for beverage bottles, made into packing straps and tarps, and synthetic nylon materials used in fishing line can all become debris with staying power. In addition, many of these items are highly buoyant, allowing them to travel in currents for thousands of miles, endangering marine ecosystems and wildlife along the way. Cigarette filters and cigar tips, fishing line, rope and gear, baby diapers and nappies, six-pack rings, beverage bottles and cans, disposable syringes, tires – the litany of litter is as varied as the products available in the global marketplace, but it all shares a common origin. At a critical decision point, someone, somewhere, mishandled it – either thoughtlessly or deliberately while on land or on the water.

According to the United Nations Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP), land-based sources account for up to 80 percent of the world's marine pollution (GESAMP, 1991). Much of the debris reaches the ocean after people engaged in beach-going activities have discarded it; debris is also blown into the water, or carried by creeks, rivers, and storm drains and sewers, and landfills to ocean areas. Other debris comes from activities on the water, including vessels (from small power and sailboats to large transport ships carrying people and goods), offshore drilling rigs and platforms, and fishing piers.

While there are laws regulating the dumping of trash at sea and on shore, the global nature of debris, its inability to be confined within territorial boundaries, and the complexity of identifying debris sources have made effective laws difficult to draft and even harder to enforce.

What are the Sources of Marine Debris?

Determining where all of the debris originates is no easy task since trash and litter can travel long distances before being deposited on our shorelines or settling on the bottom of the ocean, bay, or riverbed. Marine debris researchers traditionally classify debris sources as either *land-* or *ocean/ waterway-based*, depending on how the debris enters the water. Other factors such as ocean current patterns, climate

and tides, and proximity to urban centers, industrial and recreational areas, shipping lanes, and commercial fishing grounds influence the types and amount of debris that are found in the open ocean or collected along beaches and waterways – above and below the water’s edge.

Land-based debris blows, washes, or is discharged into the water from land areas. Sources include beachgoers; fishers; materials manufacturers, processors, and transporters; shore-based solid waste disposal and processing facilities; sewage treatment and combined sewer overflows; inappropriate or illegal dumping; and indiscriminate public littering. These materials are transported by:

Sewer overflows & sewage treatment plants – Public wastewater treatment facilities are prohibited from discharging plastics and other materials into the marine environment. Under normal “dry weather” conditions, most wastes are screened out of sewage. However, materials can bypass treatment systems and enter waterways when rain levels exceed sewage treatment facilities’ handling capacity. During these times, sewage overflows occur and debris from these discharges may include tampon applicators, condoms, and syringes.

Shore-based Solid Waste Management Practices – Both legal and illegal waste handling practices contribute to marine debris. These include the inadvertent release of debris from coastal landfills and garbage from water transports; recreational beach and roadside litter; and the illegal dumping of domestic and industrial garbage into coastal waters and offshore areas.

Litter – People’s mishandling of waste materials, the packaging from convenience items, food wrappings, beverage containers, and a host of other materials, creates the foundation for the marine debris problem.

People also generate marine debris at sea. **Ocean/waterway-based** contributors include commercial fishing vessels; merchant, military, and research vessels; recreational boats and cruise ships; and offshore petroleum platforms and associated supply vessels. Debris can end up in the water through accidental loss or system failure; historical waste management practices; or illegal disposal and indiscriminate littering.

Commercial Fishing – Commercial fishermen create marine debris when they discard ship-generated trash overboard or fail to retrieve fishing gear. Debris associated with commercial fishing includes nets and ropes, salt treatment bags, bait boxes and bags, fish baskets or totes, fish and lobster tags, and gillnet or trawl floats.

Recreational Boaters – Some boaters discard trash overboard. Such debris may contain food wrappers, beverage containers, bags, and monofilament fishing line and other related fishing gear.

Merchant, Military, and Research Vessels – Large vessels with extensive crews typically carry supplies for several months, and therefore produce solid wastes on a daily basis. But any of this debris can end up in the water if not properly disposed of or secured. The maritime and waste management industries have researched ways to better handle and store wastes aboard ships for long voyages.

Offshore Petroleum Platforms and Supply Vessels – Undersea exploration and resource extraction also contribute to the marine debris problem. Daily oil/gas platform operations can create large amounts of trash. Discarded or lost hard hats, sheeting, computer supplies, survey materials, and personal waste produced by platform and supply vessel crews can all become marine debris.

What are the Impacts of Debris?

Debris enters the environment by default through both accidental and intentional discharges. These impacts are felt locally, nationally and internationally and carry biological and socioeconomic characterizations that indicate that with continued population growth and development and inadequate solid waste management, this global problem will continue to get worse.

Human Health and Safety

Items such as broken glass, medical waste, rope, and fishing line pose immediate risks to human safety. Discarded syringes, condoms, and tampon applicators can indicate more serious water quality concerns that affect human health. Swimmers, divers and snorkelers can become entangled in submerged or floating debris. Medical and personal hygiene debris often enters the waste stream through direct sewage outflows or inadequate sewage treatment systems. These items can indicate the presence of invisible pathogenic pollutants such as streptococci, fecal coliform, and other bacterial contamination. Consumption or contact with water polluted with these pathogens can result in infectious hepatitis, diarrhea, bacillary dysentery, skin rashes, and even typhoid and cholera.

Aesthetic and Economic Impacts

Clean and safe beaches promote tourism and economic health. Litter makes shorelines unattractive and potentially hazardous, and forces communities to spend funds to increase beach maintenance. The indirect costs can be even greater. Most coastal communities rely on the income generated by seaside businesses, and the clientele that support them. Marine debris discourages people from fishing, boating, swimming, and visiting coastal areas.

Wildlife Entanglement and Ingestion

Many forms of marine debris – especially derelict fishing gear – pose serious threats to wildlife through entanglement. Debris can hamper an animal's mobility, inhibit growth and development, prevent it from eating, inflict cuts and wounds, or cause suffocation or drowning. Monofilament line, fishing nets and ropes, six-pack rings, and packing strapping bands are some of the more harmful culprits related to animal entanglements. According to the U.S. Marine Mammal Commission, 136 marine species have been reported in entanglement incidents, including six species of sea turtles, 51 species of seabirds, and 32 species of marine mammals (Marine Mammal Commission, 1996). There are no accurate and comprehensive reports on global estimates of animal mortality rates. What few reports do exist on select species are deemed to radically underestimate the true levels of mortality as animals may die off and sink before they can be observed (Laist, 1997).

The Marine Mammal Commission also reports that ingestion incidents have been documented in six of seven species of sea turtles, 111 out of the world's 312 species of seabirds, and 26 species of marine mammals (Marine Mammal Commission, 1996). Many animals confuse debris for food and cannot regurgitate an item once it has been swallowed; it often becomes lodged in their throats and digestive tracts. Debris that will not pass out of the stomach gives a false sense of fullness, causing some animals to stop eating and slowly starve to death.

Derelict fishing gear also causes damage when abandoned fishing gear and nets continue to catch and kill ocean life. This process is known as *ghost fishing*. In essence, ghost nets are perpetual "killing machines" that never stop fishing (Esteban, 2002). Worldwide, this phenomenon is having an impact on the viability of already stressed fisheries. Although there is increasing recognition of the ghost fishing problem, few studies have been conducted since 1994 (Laist and Liffmann, 2000). Limited evidence from studies conducted in Atlantic areas suggests that discarded gear may cause significant losses of some commercially valuable fish and crab species (Laist, 1997).

Habitat Destruction & Alien Species Introduction

Debris affects the water quality of aquatic benthic habitats and also causes physical damage. Moved by currents and tides, ropes and nets abrade, scour, break, and destroy living corals. Ensnared debris may also cause increased siltation and turbidity, blocking essential sunlight to, or smothering, sea grass beds and coral reef systems.

Additionally, floating marine debris may serve to transport invasive species. Drifting debris can harbor entire communities of encrusting and attached organisms and carry them great distances – often to areas where they can harm or compete with native species. Researchers have identified "hitch-hiking" benthic

invertebrates such as mollusks, polychaetes worms and bryozoans, living on floating mats of debris that are being transported by wind and surface currents potentially across the globe (Barnes, 2002).

Vessel Damage

Derelict fishing gear can cause serious damage to vessels. Nets, ropes and other derelict gear entangle vessel propellers and rudders resulting in costly repairs, loss of time, and danger to boaters and crews. Plastic bags clogging and blocking water intakes is a common cause of burned-out water pumps in recreational boats. Such incidents involve costly engine repairs, and disablement. But because most incidents go unreported, the true scope and frequency of damaging encounters between debris and vessels is difficult to calculate.

What are the Marine Debris Monitoring Programs in the United States?

On December 31, 1987, the United States ratified Annex V of the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78). Annex V prohibits the at-sea disposal of plastic wastes and regulates the distance from shore that ships may dump all other solid waste materials. Annex V became effective on December 31, 1988. The Marine Plastic Pollution Research and Control Act (MPPRCA) of 1987 (Public Law 100-220, Title II) implements Annex V legislation and extends the dumping regulations to vessels in all navigable waterways of the United States.

Section 2204 of the MPPRCA requires the U.S. Environmental Protection Agency (EPA) Administrator, the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) Administrator, and the U.S. Coast Guard to conduct a public education program in the marine environment. Section 2204 also directs the EPA Administrator, along with the Secretary of Commerce and the U.S. Coast Guard, to encourage the formation of volunteer groups to assist in the monitoring, reporting, cleanup, and prevention of ocean and shoreline pollution. These policies frame the foundation of the marine debris prevention strategy in the United States and have supported other monitoring and programming development worldwide. The result of this legislation and research conducted by The Ocean Conservancy (formerly the Center for Marine Conservation) was the development of the International Coastal Cleanup and the National Marine Debris Monitoring Program.

A. International Coastal Cleanup

The International Coastal Cleanup (ICC) engages the public to remove trash and debris from the world's beaches and waterways, to identify the sources of debris, and to change the behaviors that cause pollution. The origins of the ICC began in 1985 with research conducted by The Ocean Conservancy (then known as the Center for Marine Conservation – CMC) on plastics in the marine environment. Contracted by the U.S. Environmental Protection Agency, Office of Toxic Substances, CMC produced the report, *Plastics in the Ocean: More Than a Litter Problem*, which was the first study to identify plastics as a significant marine debris hazard. The report's findings led the U.S. Congress to adopt MARPOL 73/78 Annex V and to enact legislation (MPPRCA) to limit the dumping of garbage from boats and to help control land-based sources of marine debris, such as stormwater systems and combined sewer systems. The September 17, 2005 Cleanup is the 20th annual event coordinated by The Ocean Conservancy, partnering with nearly a thousand other organizations (e.g. conservation groups/NGOs, churches, schools, civic clubs), resource management departments, government agencies, corporate supporters and sponsors, and most importantly, a half million volunteers worldwide.

Since its first beach cleanup in 1986 in Texas, The Ocean Conservancy and its many partners have grown the ICC into a global volunteer effort devoted to the marine environment. To date, all 55 U.S. states and territories and 127 countries bordering every major body of water on the planet have participated in the ICC. In the past two decades, 5.8 million people have collected more than 100.4 million pounds of debris along 158,657 miles of shoreline and in underwater areas.

ICC Data Collection

The ICC is characterized as a volunteer-based campaign that includes a data collection exercise using standardized data cards for tabulating the types, amounts and sources of debris found during the annual Cleanup. The information collected from the annual cleanup event are tabulated and analyzed by The Ocean Conservancy. The data cards developed through the ICC have evolved from a cataloging tool for debris forms based on material type (glass, paper, hard and foamed plastic, metal, rubber and wood) to a focus on the behaviors and activities that produce the debris as an approach for prevention and abatement. The categories used for sorting the debris collected during the ICC since 2001 include specific source and activity groups – shoreline and recreational activities, ocean/waterway activities, smoking-related activities, dumping activities, and medical/personal hygiene (see Table 1). The data card is produced in English, Spanish and French. See Appendix A to review a sample ICC data card.

Debris Sources & Activities	Key Debris Forms
Shoreline & Recreational Activities: debris from beach-goers, sports/games, festivals, litter from streets/storm drains	bags, balloons, beverage bottles (plastic) 2 liters or less, beverage bottles (glass), cups/plates/forks/knives/spoons, food wrappers/containers, pull tabs, 6-pack holders, shotgun shells/wadding, straws/stirrers, toys
Ocean/Waterway Activities: debris from recreational/commercial fishing and boat/vessel operations	bait containers/packaging, bleach/cleaner bottles, buoys/floats, crab/lobster/fish traps, crates, fishing line, fishing lures/light sticks, fishing nets, light bulbs/tubes, oil/lube bottles, pallets, plastic sheeting/tarps, rope, strapping bands
Smoking-related Activities:	cigarettes/cigarette filters, cigarette lighters, cigar tips, tobacco packaging/wrappers
Dumping Activities:	appliances, batteries, building materials, car/car parts; 55-gallon drums, tires
Medical/Personal Hygiene:	condoms, diapers, syringes, tampons/tampon applicators

Table 1. The Ocean Conservancy’s data card components used in the International Coastal Cleanup listing debris sources/activities and associated debris forms.

The ICC data card, which has been researched and designed to provide a “snapshot” assessment of the types and amounts of debris found during the annual Cleanup is in the form of a survey tally card. The ICC does not employ a rigorous, scientific protocol for its methodology, as there are inherent differences and inconsistencies generated in the data based on site selection and sampling techniques. Therefore, comparisons using ICC data are limited, but do serve as a useful informational tool related to the nature of marine debris worldwide. The result is a unique, global database of debris information. Data from the Cleanup provides the framework for government action to limit marine debris and to educate the public about litter and pollution prevention.

The data collected and analyzed from the annual Cleanup is used locally, nationally and internationally to influence policy decisions, spawn campaigns for recycling programs, support public education programs, launch adopt-a-beach programs, and even stormwater system overhaul and legislative reform. In U.S. Commission on Ocean Policy Report released in September 2004, the International Coastal Cleanup and the National Marine Debris Monitoring Program (see discussions below) were recognized as significant sources of information characterizing the types, amounts and sources of marine debris collected along

the beaches and waterways in the U.S. and its territories. In June 2005 at the sixth United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea (UNICPOLOS), the ICC was presented as a model for addressing public awareness on marine debris issues and a characterization of the debris types, sources and impacts reported around the world through its 20-year campaign.

ICC Data Analysis

National:

The data collected during the International Coastal Cleanups from 2002-2004 (United States) have been compiled and analyzed for presentation in this paper to aid in characterizing the debris composition and source identification. National ICC data totals (land and underwater combined) of the debris types and amounts collected during the Cleanup in the past three years are presented in Table 2 on page 7.

The most abundant marine debris forms tabulated during the ICC in the United States from 2002-2004 were recorded in the categories of smoking-related activities (e.g. cigarette filters) and shoreline and recreational activities (e.g. food wrappers/containers, <2 liters beverage bottles–plastic, cups/plates/ forks/knives/spoons, and beverage bottles–glass). It should be noted that these debris forms are discarded materials originating as smoking products and food and beverage packaging remnants. Further review of the data collected during this period indicates that the most abundant debris forms are associated with **land-based activities** as evidenced in a percent source analysis of this data with land-based percentages ranging from 55.89 in 2002 to 60.69 in 2004. **Ocean-based activities** exhibited percent source levels of 6.16 in 2002, 6.41 in 2003 and 6.34 in 2004. See Figure 1.

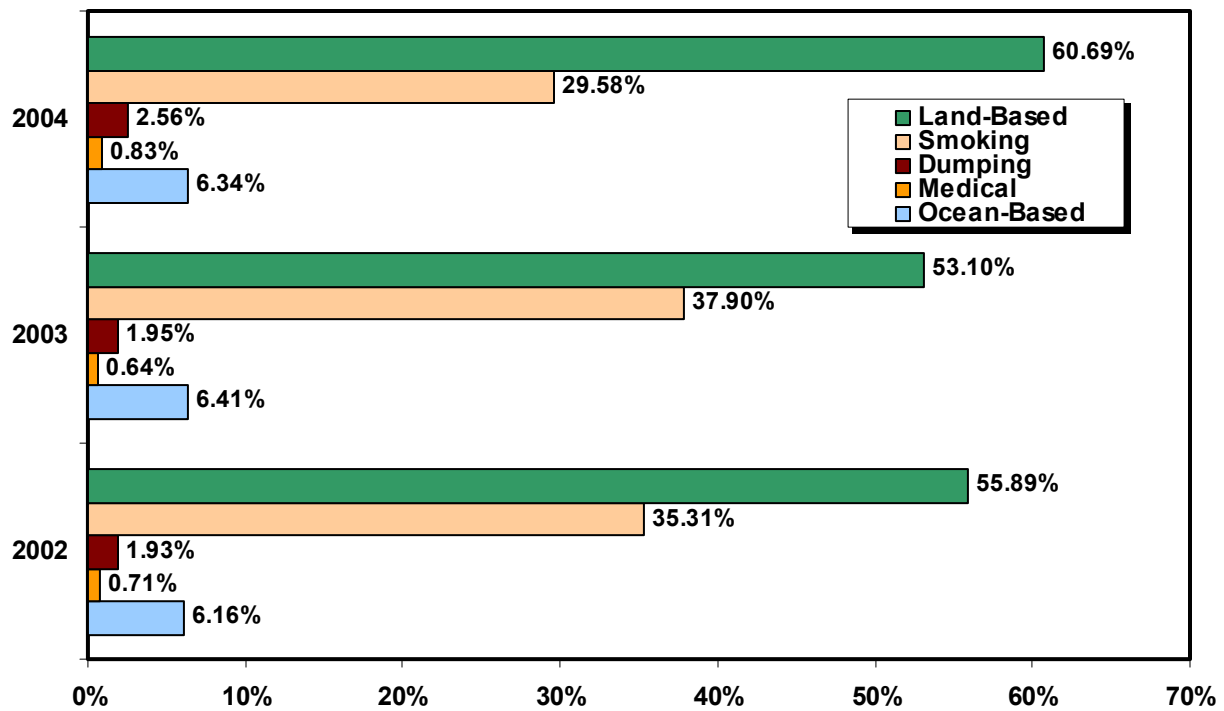


Figure 1. Source percentages for total debris for 2002-2004 Cleanups – United States. Data compiled from the 2002, 2003, and 2004 International Coastal Cleanup Reports published by The Ocean Conservancy.

Shoreline and Recreational Activities	2002	2003	2004
Bags	190,477	170,053	158,037
Balloons	57,387	45,996	43,136
Beverage Bottles (Glass)	226,251	211,359	199,804
Beverage Bottles (Plastic) 2 liters or less	223,029	227,220	209,075
Beverage Cans	238,826	207,225	189,132
Caps, Lids	363,857	356,513	339,841
Clothing, Shoes	50,205	48,807	48,293
Cups, Plates, Forks, Knives, Spoons	250,511	205,301	188,262
Food Wrappers/Containers	444,447	418,795	390,995
Pull Tabs	49,277	50,971	43,904
Shotgun Shells/Wadding	16,792	20,689	14,247
Six-Pack Holders	20,987	18,244	18,897
Straws, Stirrers	182,794	180,091	158,984
Toys	37,365	37,956	38,154
Ocean/ Waterway Activities	2002	2003	2004
Bait Containers/Packaging	21,511	21,126	18,529
Bleach/Cleaner Bottles	14,263	11,743	11,290
Buoys/Floats	19,494	18,737	12,110
Crab/Lobster/Fish Traps	6,035	7,860	3,685
Crates	2,580	2,782	2,140
Fishing Line	32,741	32,862	25,981
Fishing Lures/Light Sticks	14,082	12,593	11,955
Fishing Nets	6,278	7,737	5,359
Light Bulbs/Tubes	5,520	4,854	4,614
Oil/Lube Bottles	14,120	10,838	10,331
Pallets	2,433	2,839	2,051
Plastic Sheeting/Tarps	44,163	47,247	40,436
Rope	57,099	61,379	47,871
Strapping Bands	18,829	22,730	16,858
Smoking-Related Activities	2002	2003	2004
Cigar Tips	67,649	72,078	56,551
Cigarette Lighters	21,369	21,362	17,845
Cigarettes/Cigarette Filters	1,345,833	1,426,613	880,807
Tobacco Packaging/Wrappers	51,090	49,564	39,353
Dumping Activities	2002	2003	2004
55-Gallon Drums	769	833	864
Appliances (refrigerators, washers, etc.)	1,606	2,061	1,788
Batteries	6,304	6,135	5,836
Building Materials	55,388	54,935	59,255
Cars/Car Parts	10,447	9,891	10,206
Tires	6,828	6,916	8,031
Medical/Personal Hygiene	2002	2003	2004
Condoms	8,209	7,576	7,329
Diapers	7,776	5,897	5,863
Syringes	2,529	2,910	2,937

Table 2. Debris item totals compiled from 2002-2004 International Coastal Cleanups in the United States.
Source: The Ocean Conservancy: 2002, 2003 & 2004 International Coastal Cleanup Reports.

ICC Data Analysis (cont.)

U.S. Pacific Coast:

When studying debris composition for the purposes of source identification, regional analyses give additional insight regarding the specific debris forms that are being contributed locally per watershed dynamics, land-use practices, and select offshore current patterns. ICC data totals (land and underwater combined) for the U.S. Pacific Coast of the debris types and amounts collected during the Cleanup in the past three years are presented in Table 3 on page 9.

Comparing the composite data from the cleanups conducted along the U.S. Pacific Coast to the national ICC data regarding the most abundant debris forms, reveal a similar pattern in abundance. The most abundant marine debris forms tabulated during the ICC in the U.S. Pacific Coast from 2002-2004 were recorded in the categories of smoking-related activities (e.g. cigarette filters) and shoreline and recreational activities (e.g. food wrappers/containers, caps/lids, cups/plates/ forks/knives/spoons, and bags). It should be noted that these debris forms are discarded materials originating as smoking products and food and beverage packaging remnants. Further review of the data collected during this period indicates that the most abundant debris forms are associated with **land-based activities** as evidenced in a percent source analysis of this data with land-based percentages ranging from 50.03 in 2002 to 49.83 in 2004. **Ocean-based activities** exhibited percent source levels of 4.58 in 2002, 5.05 in 2003 and 4.32 in 2004. See Figure 2.

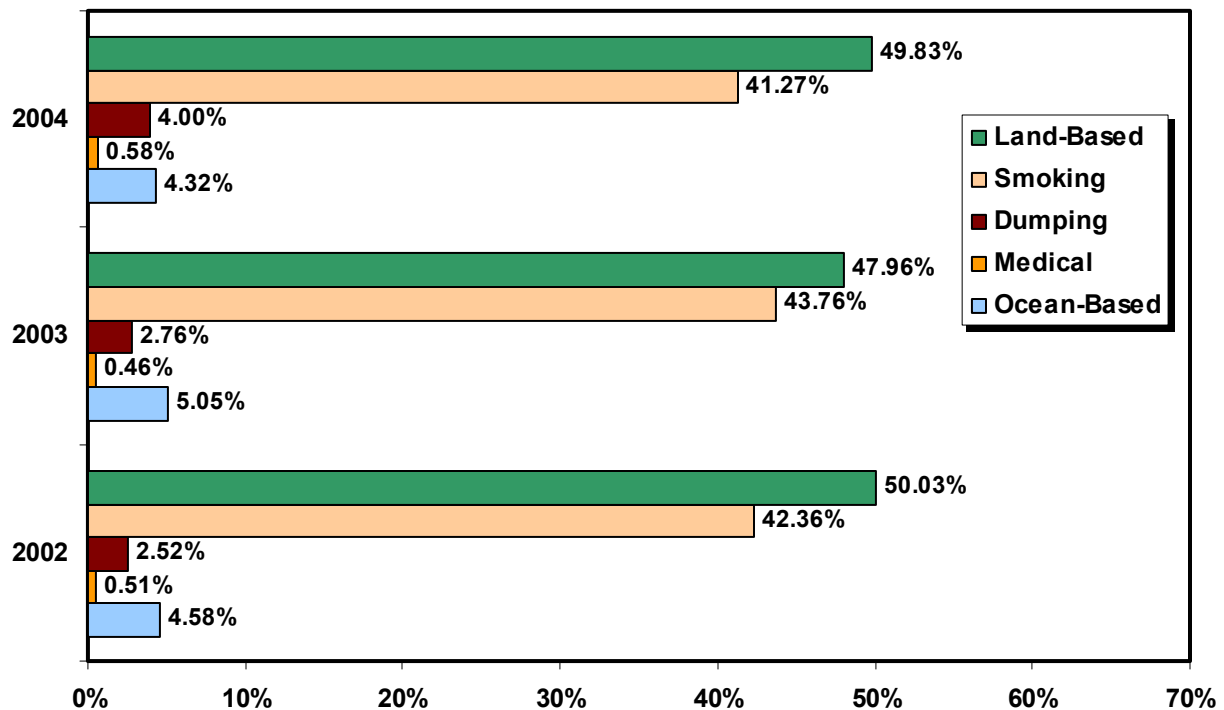


Figure 2. Debris source percentages for total debris for 2002-2004 Cleanups – U.S. Pacific Coast (CA, OR, and WA). Data compiled from the 2002, 2003, and 2004 International Coastal Cleanup Reports published by The Ocean Conservancy.

Shoreline and Recreational Activities	2002	2003	2004
Bags	37,086	31,333	32,907
Balloons	11,003	8,664	11,199
Beverage Bottles (Glass)	32,280	32,550	34,172
Beverage Bottles (Plastic) 2 liters or less	24,911	26,124	27,123
Beverage Cans	23,741	22,026	24,740
Caps, Lids	60,594	63,009	62,094
Clothing, Shoes	9,479	10,460	10,962
Cups, Plates, Forks, Knives, Spoons	40,499	36,970	40,162
Food Wrappers/Containers	113,200	109,827	116,180
Pull Tabs	7,728	9,344	7,647
Shotgun Shells/Wadding	2,327	5,346	3,212
Six-Pack Holders	2,182	2,560	2,259
Straws, Stirrers	32,567	36,047	31,497
Toys	7,621	9,113	8,727
Ocean/ Waterway Activities	2002	2003	2004
Bait Containers/Packaging	3,037	2,854	2,761
Bleach/Cleaner Bottles	1,110	1,355	876
Buoys/Floats	3,158	2,299	1,875
Crab/Lobster/Fish Traps	993	872	567
Crates	341	395	259
Fishing Line	4,389	6,312	4,291
Fishing Lures/Light Sticks	1,683	1,497	1,680
Fishing Nets	597	984	767
Light Bulbs/Tubes	693	745	799
Oil/Lube Bottles	1,519	1,124	1,473
Pallets	473	761	444
Plastic Sheeting/Tarps	7,995	9,932	9,291
Rope	7,255	8,341	6,503
Strapping Bands	3,862	5,038	4,246
Smoking-Related Activities	2002	2003	2004
Cigar Tips	11,846	23,006	15,798
Cigarette Lighters	3,617	3,701	2,921
Cigarettes/Cigarette Filters	318,384	331,250	313,234
Tobacco Packaging/Wrappers	9,248	10,087	9,983
Dumping Activities	2002	2003	2004
55-Gallon Drums	93	58	72
Appliances (refrigerators, washers, etc.)	270	256	413
Batteries	1,205	1,259	1,545
Building Materials	16,354	19,031	27,201
Cars/Car Parts	1,628	1,675	2,541
Tires	867	918	1,353
Medical/Personal Hygiene	2002	2003	2004
Condoms	1,908	1,741	2,283
Diapers	957	752	1,094
Syringes	412	492	407
Tampons/Tampon Applicators	871	883	1,044

Table 3. Debris item totals compiled from 2002-2004 International Coastal Cleanups along the U.S. Pacific Coast (CA, OR & WA). *Source: The Ocean Conservancy: 2002, 2003 & 2004 International Coastal Cleanup Reports.*

ICC Data Interpretation

Winds, waves, currents, and regional land/waterway-use activities along with seasonal climatic variations can influence debris patterns and trends in deposition. Seasonality in debris patterns and trends should be considered when assessing the types, amounts and sources. In temperate areas where summer to fall beach activities are higher, summer storms and increased stormwater activity can result in a higher influx of debris and other pollutants. To better understand the debris composition analyzed from the ICC, it is recommended that the researcher have an idea as to the regional land/waterway-use activities associated to a beach area and to look at the annual data over a period of several years.

An ICC Data Story: The issue of data interpretation was expressly demonstrated in 1996 when new Cleanup programs were emerging and inland areas were being cleaned up for the first time as part of the ICC. In Arizona, one of their first cleanup efforts involved extensive efforts to retrieve debris found underwater in a popular, recreational public lake. The resulting counts of recovered cans and bottles raised Arizona's debris numbers to one of the highest in the U.S. that year for beverage containers. The media poked fun at the numbers resulting in a phone call from the Governor's office asking why CMC was insinuating that Arizonians had a drinking problem? The ICC staff reviewed the data and told them that the numbers were correct, but that it was not a problem. Arizona was actually leading in the country for inland state waterway cleanup efforts and that there had not been an organized cleanup in that lake. The debris that was collected had accumulated over many, many years deposited by visiting boaters and picnickers. Over the coming years, the data from this lake area would be studied and the numbers would go down, especially with the recycling programming that the state was implementing. Programs were implemented and their beverage container numbers dropped. There was no drinking problem in Arizona, just a need for improved solid waste handling practices!

B. National Marine Debris Monitoring Program

Through a multi-year cooperative agreement with the U.S. Environmental Protection Agency, The Ocean Conservancy developed and field-tested the National Marine Debris Monitoring Program (NMDMP). This is a scientific marine debris-monitoring program designed to assess the effectiveness of current U.S. marine debris legislation. NMDMP assesses several aspects of debris, including accumulation rates, types and amounts of debris found at specific geographic locations, oceanographic and meteorological conditions, and proximity to land-based or ocean-based sources. The study consists of a sampling protocol that examines the occurrence of 30-specific debris items in order to answer the following research questions:

1. Is the amount of debris on our coastlines decreasing?
2. What are the major sources of the debris?

NMDMP has been successfully developed and field-tested through a national network of 500 trained volunteers who monitor over 100 sites in 21 coastal U.S. states and two territories (Puerto Rico and U.S. Virgin Islands). The program developed nine regional designations, based on prevailing current patterns, marine debris information, and logistics. The results of this five-year study will provide the required data needed to scientifically assess marine debris trends and sources in the United States. Data collected through NMDMP is posted quarterly for public access through The Ocean Conservancy's website at www.oceanconservancy.org/nmdmp.

Trained NMDMP volunteers monitor randomly selected beaches for marine debris and conduct beach cleanups every 28 days during a five-year period. NMDMP takes the idea of beach cleanups a step further by standardizing marine debris collection using a scientifically valid protocol to determine the status and trends of marine debris pollution.

NMDMP History

Prompted by the recognition of the threat posed by marine debris pollution and armed with marine debris data collected through The Ocean Conservancy's International Coastal Cleanups (ICC), the United States government ratified and enacted important marine debris legislation in 1987. Congress ratified Annex V of the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78). This important set of legislation was aimed at addressing marine debris pollution at its source. Annex V, which became effective in 1988, prohibits the at-sea disposal of plastic waste and regulates the distance from shore that all other solid waste materials can be dumped. Also enacted in 1987 was the Marine Plastic Pollution Research and Control Act (MPPRCA), Public Law 100-220, Title II, which extends MARPOL Annex V legislation to all navigable waterways of the United States.

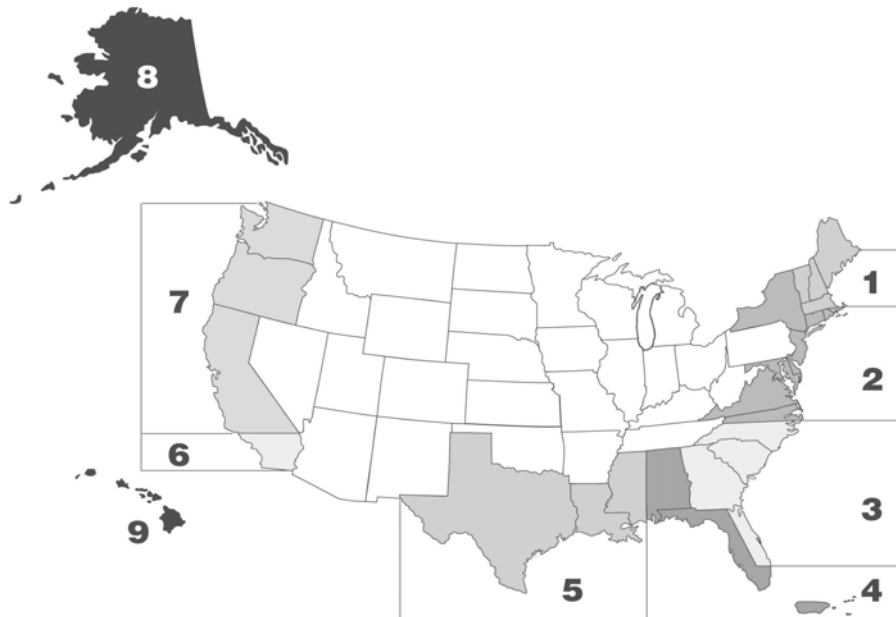
In 1989, the National Oceanic and Atmospheric Administration (NOAA) and the National Park Service (NPS) agreed to conduct a five-year pilot study developing standardized methods for quantifying marine debris. In addition the EPA and other Federal Agencies established a working group to monitor marine debris status and trends as directed by the MPPRCA (section 2204). The MPPRCA required that the EPA, NOAA and the U.S. Coast Guard (USCG) form "Citizen Pollution Patrols" utilizing volunteers to monitor, cleanup and prevent ocean and shoreline pollution.

In 1990, the EPA was instructed by Congress to assess the effectiveness of marine debris legislation and other methods to control debris. The EPA and The Ocean Conservancy joined in the effort since the most geographically comprehensive and continuous set of marine debris data had been collected and compiled in The Ocean Conservancy's ICC Database. The ICC Database provided a means to assess and review the nature and characteristics of marine debris pollution over the past 20 years. The marine debris information gathered during the annual International Coastal Cleanup surveys, though useful and valuable, is a non-scientific means of collecting information that at best provides a snapshot into the nature of marine debris. It was apparent that a standardized method of monitoring marine debris was needed to statistically determine if existing legislation was working to reduce the debris in our oceans.

NMDMP Methodology

In 1990, Congress appropriated funds to the EPA for the development of demonstration programs to utilize volunteers in monitoring and removing marine debris from selected beaches in New Jersey and Maryland. As part of the program The Ocean Conservancy in conjunction with the EPA, began to test a statistically valid methodology designed by Ribic (1991) for determining trends in marine debris. Beach sites were selected in Maryland, New Jersey, Texas and Alabama and volunteers were recruited and trained in the program protocol. A methodology was developed by a working group comprised of representatives from NOAA, NPS, CMC/The Ocean Conservancy, USCG, the Marine Mammal Commission, and selected researchers and was reviewed by all federal agencies that monitored marine debris. Based on the results obtained during the pilot program, the goal of the NMDMP was set to be able to measure a 30% change in 30 selected marine debris items on the U.S. coastal shorelines, with a Type I error rate of 0.10 and power of 0.84. This requires the monthly sampling of randomly selected beach sites in nine coastal regions (see Figure 3 on page 12), for a five-year period (Ribic, 1991, Ribic et al., 1992). Each study site must be of low to moderate slope, composed of sand to small gravel, have a length of at least 500 meters (1/3 mile), have clear direct access to the sea (not blocked by breakwaters or jetties) and must be accessible to volunteers year round.

Care was also taken to select beach sites that would not impact any endangered or protected species such as sea turtles, sea birds, marine mammals, and sensitive beach vegetation. At each designated study site, trained volunteers conduct beach cleanups and marine debris surveys every 28 days.



- Region 1: U.S. – Canada border to Provincetown, MA
- Region 2: South of Cape Cod, MA to Beaufort, NC
- Region 3: Morehead City, NC to Port Everglades, FL
- Region 4: Port Everglades, FL to Gulf Shores, AL, including Puerto Rico & U.S. Virgin Islands
- Region 5: Dauphin Island, AL to U.S. – Mexico border
- Region 6: U.S. – Mexico border to Point Conception, CA
- Region 7: North of Point Conception, CA to U.S. – Canada border
- Region 8: Alaska (southern coast and Aleutian Islands)
- Region 9: Hawaiian Islands

Figure 3. National Marine Debris Survey Regions. Go to <http://www.oceanconservancy.org/nmdmp> to access GPS coordinates for and descriptions of monitoring study sites.

NMDMP Data Collection

Data are recorded on a specialized NMDMP data card by the volunteer survey teams. Information is recorded on thirty specific debris indicator items grouped into three general categories of debris - *ocean-based*, *land-based*, and *general sources* (items that may originate as either ocean- or land-based debris).

Ocean-Based Source Indicator Items: gloves, plastic sheets (≥ 1 meter), light bulbs/tubes, oil/gas containers (> 1 quart), pipe-thread protectors, nets (≥ 5 meshes), traps/pots, fishing line, light sticks, rope (≥ 1 meter), salt bags, fish baskets, cruise line logo items, floats/buoys.

Land-Based Source Indicator Items: syringes, condoms, metal beverage cans, motor oil containers (1 quart), balloons, six-pack rings, straws, tampon applicators, cotton swabs.

General Source Indicator Items: plastic bags (< 1 meter), plastic bags (≥ 1 meter), strapping bands (open), strapping bands (closed), plastic beverage bottles, plastic food bottles, plastic bleach/cleaner bottles, other plastic bottles.

Table 4. The Ocean Conservancy's data card components used in the National Marine Debris Monitoring Program listing debris sources and associated debris forms.

The 30 specific items listed on the data card will provide the information needed to measure the changes and trends in the amount of debris appearing on the U.S. coastline. See Appendix B to review a sample NMDMP data card. Additional debris items may also be tracked that are specific and meaningful to local regions (i.e. mesh bait bags in New England, fluorescent light tubes in the Gulf of Mexico). The data, which are collected by each volunteer survey team, is sent back to The Ocean Conservancy's NMDMP Project Team where the data is processed, verified and entered into the NMDMP database.

As with any scientific study, quality assurance (QA) is practiced to ensure that all data collected is reproducible and comparable. It is part of the protocol and responsibility of each monitoring site Survey Director to follow QA procedures during the survey set-up, volunteer training, and data collection activities. Throughout the course of each year of the study, Survey Directors conduct random QA procedures as part of the monitoring protocol.

The data collected from the NMDMP will be analyzed at the end of a five-year study period and will yield a more in-depth understanding into the nature and trends of marine debris in the U.S. Data will be examined both on a national basis as well as by region. Final analysis on a national level will begin in 2007 to examine trends in marine debris as well as an examination of the major sources of the debris. In the interim, preliminary data summaries will be computed to provide some insight as to debris conditions for use in local programming and pollution prevention efforts.

Preliminary NMDMP Debris Analyses

A preliminary examination of the NMDMP database was conducted to examine the amounts and sources of marine debris at the regional level (U.S. West Coast – CA, OR, WA) during the Fall Quarter (September – November) from 2002-2004 for comparison to the data collected during the 2002-2004 ICC events. The corresponding NMDMP regions associated with the U.S. West Coast are Regions 6 and 7. Refer to Figure 3 on page 12 for a geographical depiction.

During the Fall Quarter, 2002-2004 for this data comparison in Region 6, the number of sites where surveys were conducted was 6 in 2002, 4 in 2003 and 5 in 2004 with a total of 15, 9 and 9 surveys conducted respectively. In Region 7, the number of sites where surveys were conducted was 13 in 2002, 10 in 2003 and 9 in 2004 with a total of 13, 10 and 9 surveys conducted respectively.

In comparison to corresponding data collected during the annual International Coastal Cleanup, similar patterns in abundance of marine debris types and debris sources were observed. In Region 6, the top debris forms associated with land-based sources included straws, balloons, and beverage cans (metal). Ocean-based debris types were lead by rope (≥ 1 meter), floats/buoys, and fishing line. In reviewing general sources, the top debris forms included plastic bags w/seam (< 1 meter), beverage bottles (plastic) and other bottles (plastic), which in comparison to the debris source categories of the ICC, a large portion of the debris types in the general category are applicable to land-based activities.

In Region 7, the top debris forms associated with land-based sources included were identical to the data in Region 6 with straws, balloons, and beverage cans (metal) as the leading debris forms collected, as were the ocean-based debris types with rope (≥ 1 meter), floats/buoys, and fishing line as the top debris forms reported. In reviewing general sources computed for Region 7, the top debris forms included plastic bags w/seam (< 1 meter), beverage bottles (plastic) and food bottles (plastic) – a slight variation from Region 6 with other bottles (plastic).

The total debris items recorded during the Fall Quarters in Regions 6 and 7 from 2002-2004 are presented in Tables 5 and 6 on pages 14 and 15.

Ocean-Based	2002	2003	2004
Gloves	0	0	5
Plastic sheets \geq 1 meter	4	5	5
Light bulbs/tubes	0	2	2
Oil/gas containers	0	0	0
Pipe-thread protectors	8	3	6
Nets \geq 5 meshes	0	1	5
Traps/pots	4	1	0
Fishing Line	9	4	10
Light sticks	7	2	6
Rope \geq 1 meter	31	9	8
Salt bags	2	1	1
Fish baskets	3	0	0
Cruiseline logo items	0	0	3
Floats/Buoys	7	16	2
Land-Based	2002	2003	2004
Syringes	1	1	0
Condoms	1	1	0
Metal beverage cans	62	13	59
Motor oil containers	0	0	0
Balloons	215	152	76
Six-pack rings	0	0	6
Straws	395	180	137
Tampon applicators	1	1	5
Cotton swabs	0	0	1
General	2002	2003	2004
Plastic bags with seam $<$ 1 meter	156	110	43
Plastic bags with seam \geq 1 meter	3	8	7
Straps: Open	14	24	7
Straps: Closed	3	2	1
Plastic bottles: beverage	51	18	85
Plastic bottles: food	5	0	29
Plastic bottles: bleach/cleaner	2	0	3
Other plastic bottles	44	7	90

Table 6. NMDMP Region 6 debris totals, Fall Quarter (2002-2004). *Source:* NMDMP database, <http://www.oceanconservancy.org/nmdmp>.

Ocean-Based	2002	2003	2004
Gloves	31	1	2
Plastic sheets \geq 1 meter	10	2	0
Light bulbs/tubes	1	1	0
Oil/gas containers	3	0	0
Pipe-thread protectors	4	4	3
Nets \geq 5 meshes	7	8	2
Traps/pots	2	1	11
Fishing Line	32	12	11
Light sticks	2	5	2
Rope \geq 1 meter	92	65	42
Salt bags	0	2	0
Fish baskets	0	1	5
Cruiseline logo items	0	0	0
Floats/Buoys	36	7	20
Land-Based	2002	2003	2004
Syringes	2	1	3
Condoms	3	3	1
Metal beverage cans	66	44	60
Motor oil containers	2	1	0
Balloons	70	28	41
Six-pack rings	4	8	5
Straws	96	53	166
Tampon applicators	3	3	7
Cotton swabs	2	0	1
General	2002	2003	2004
Plastic bags with seam $<$ 1 meter	237	69	83
Plastic bags with seam \geq 1 meter	23	3	8
Straps: Open	4	3	13
Straps: Closed	0	1	0
Plastic bottles: beverage	76	51	47
Plastic bottles: food	44	31	30
Plastic bottles: bleach/cleaner	3	3	8
Other plastic bottles	32	12	17

Table 6. NMDMP Region 7 debris totals, Fall Quarter (2002-2004). *Source:* NMDMP database, <http://www.oceanconservancy.org/nmdmp>.

NMDMP Regions 6 and 7 – Data Summary

Data collected in Regions 6 and 7 during the Fall Quarters of 2002-2004 were pooled and sorted to produce percent source comparisons according to land- and ocean-based and general sources as prescribed in the protocol of the NMDMP study. Examination of these compilations reveals that **land-based sources** of debris were the most abundant as evidenced in a percent source analysis of this data with land-based percentages ranging from 63.62 in 2002, 49.69 in 2003 and 48.05 in Region 6. Region 7 shows a slightly different pattern with general sources dominating in 2002 and 2003 with percentages of 49.15 and 41.59 respectively. In 2004, land-based sources lead with 43.74 percent.

Ocean-based sources ranked at the bottom for both Regions ranging from 6.99 to 21.50 percent for both regions. It should be noted that the ocean-based sources were higher in Region 7 when compared

to the data in Region 6. See Figures 4 and 5 to review debris source percent comparisons for NMDMP Regions 6 and 7, Fall Quarter, 2002-2004.

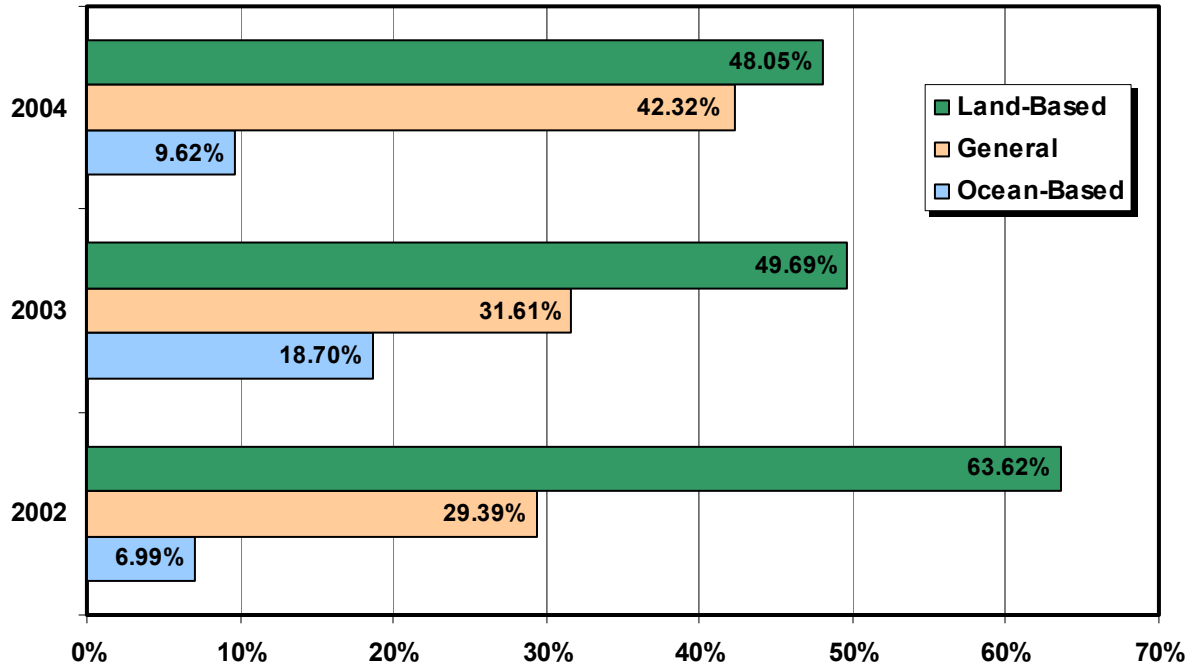


Figure 4. NMDMP Region 6, Fall Quarter (Sep. – Nov.), Debris Source Percentages. *Source:* NMDMP database, <http://www.oceanconservancy.org/nmdmp>.

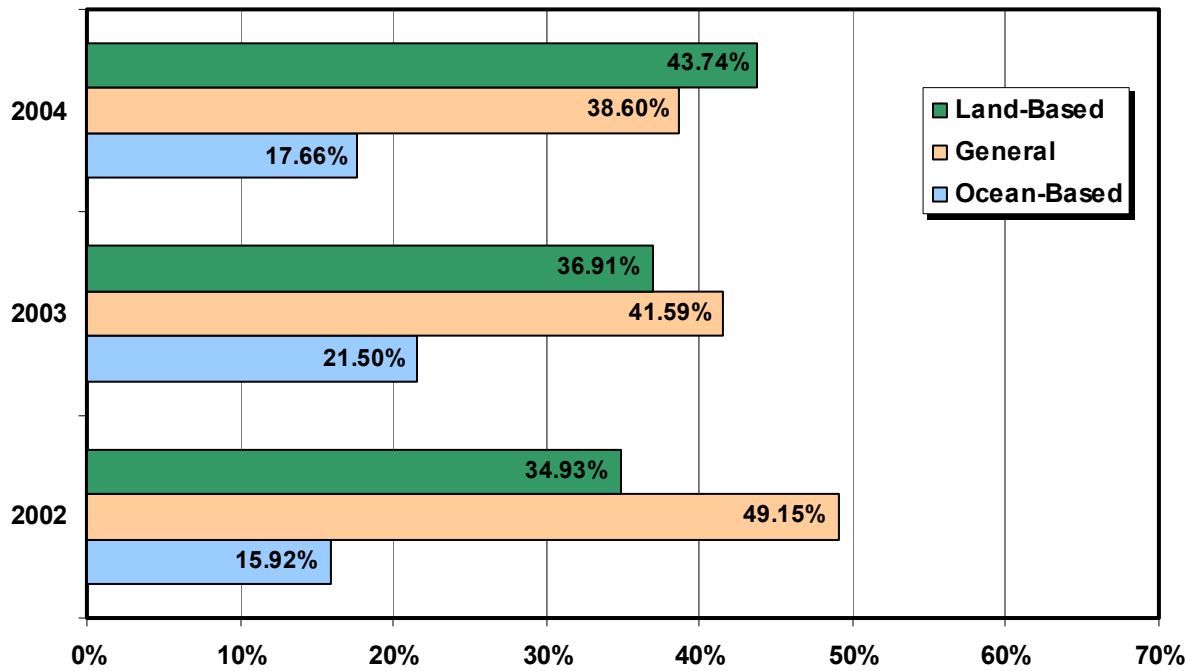


Figure 5. NMDMP Region 7, Fall Quarter (Sep. – Nov.), Debris Source Percentages. *Source:* NMDMP database, <http://www.oceanconservancy.org/nmdmp>.

SUMMARY

The information that is being collected and compiled through the International Coastal Cleanup (ICC) and the National Marine Debris Monitoring Program (NMDMP) provides a valuable information base that can be used to catalog and analyze the main sources and activities responsible for marine debris pollution. The information and data presented in this paper from the International Coastal Cleanup and the National Marine Debris Monitoring Program show that the dominant sources of debris emanate from **land-based sources and activities**. This does not mean that the other sources and activities are to be considered less important – all forms of debris can be harmful and need to be reduced and abated.

Despite knowing the causes of marine debris and how it enters the environment, we continue to facilitate its deposition. Alternative materials that are less invasive or harmful to the environment exist, but they have not been successfully integrated into the economic mainstream. Lack of enforcement and inadequate compliance with existing laws that would help to abate marine debris make those laws ineffectual. To fight these developments, we must continue with current efforts by governments and the private sector to increase awareness, establish debris abatement programs, and ultimately change human behaviors.

To effectively reduce and control marine debris and its environmental impacts, key stakeholders from diverse groups must be involved. This list includes local citizens; governments, agencies and authorities (national, regional, and municipal); organizations (international/ national, civic, religious, nongovernmental, and consumer); institutions (research, education, and medical); businesses (hotels and restaurants, outdoor recreation, manufacturers, and vendors); and industries (fisheries, tourism, dive and waste management).

A review of the available data and other information on debris found worldwide indicates that the dominant types and sources of debris come **land-based activities** resulting from what we consume (including food wrappers, beverage containers, cigarettes and related smoking materials), what we use in transporting ourselves by sea, and what we harvest from the sea (fishing nets & gear that leave in the sea). Industries affiliated with the aforementioned products and services play a critical role in debris management and abatement. Only with their involvement and support can we create effective solutions to the debris problem.

Numerous laws regulate litter and debris on both land and sea. Unfortunately, laws do not guarantee compliance. In addition to enforcement and penalties, a sense of environmental stewardship among ocean users is essential for laws to be effective. Recent legislation was introduced focusing on marine debris prevention. The Marine Debris Research Prevention and Reduction Program Act (S. 362) passed the Senate on July 1, 2005. As of the production of this paper, the bill is in the House for further discussion. The bill directs the National Oceanic and Atmospheric Administration (NOAA) and the United States Coast Guard (USCG) to establish programs for the identification of type and source, assessment, reduction, and prevention of marine debris. These programs would be carried out in cooperation with other Federal and non-Federal programs. The bill would also direct NOAA and the USCG to re-establish the Interagency Marine Debris Coordinating Committee, develop a Federal marine debris information clearing house, and work with the international community in order to reduce the problem of marine debris on a global scale. The U.S. Commission on Ocean Policy recognized marine debris as one of the major threats to our nation's marine resources and to human health and safety along our coasts. However, no Federal program currently exists that deals explicitly with the problem of marine debris. The Marine Debris Bill needs to be passed so that we can effectively deal with marine debris and bring this pervasive pollution problem to its knees.

Controlling and reducing debris in the marine environment is a significant – but achievable – challenge. If we are to conserve our ocean resources responsibly and successfully, it is a challenge that we must all face together and be willing to take the necessary steps and do what it takes. Every piece of debris on this planet has a person's face behind it. We are the cause and the only solution.

REFERENCES

- Barnes, D.K.A. 2002. Invasions by marine life on plastics. *Nature* 416: 808-809.
- Coe, James M. & Rodgers, Donald B., Eds. 1997. *Marine Debris: Sources, Impacts and Solutions*. Springer-Verlag: New York. 432 pp.
- Esteban, Michelle. 2002. Tracking Down Ghost Nets. *European Cetacean Bycatch Campaign Website* <http://www.eurocbc.org/page54.html>.
- GESAMP (Group of Experts on the Scientific Aspects of Marine Pollution). 1991 *The State of the Marine Environment*. London: Blackwell Scientific Publications. 146 pp.
- Laist, David W. 1997. Impacts of Marine Debris: Entanglement of Marine Life in Marine Debris Including a Comprehensive List of Species with Entanglement and Ingestion Records. In *Marine Debris: Sources, Impacts, and Solutions*. Eds. James M. Coe and Donald B. Rogers. Springer-Verlag, NY. pp. 99-140.
- Laist, David, W. and Michael Liffmann. 2000. Impacts of Marine Debris: Research and Management Needs. *Issue Papers of the International Marine Debris Conference, Aug. 6-11, 2000*. Honolulu, Hawaii. pp. 16-29.
- Marine Mammal Commission. 1996. *Marine Mammal Commission Annual Report to Congress*. "Effects of Pollution on Marine Mammals." Bethesda, Maryland. 247 pp.
- National Marine Debris Monitoring Program website: <http://www.oceanconservancy.org/nmdmp>.
- The Ocean Conservancy. 2005. *2004 International Coastal Cleanup Results*. Washington, DC. 39 pp.
- The Ocean Conservancy. 2004. *2003 International Coastal Cleanup Results*. Washington, DC. 52 pp.
- The Ocean Conservancy. 2003. *2002 International Coastal Cleanup Results*. Washington, DC. 34 pp.
- Ribic, Christine A. 1991. *Design of Shoreline Surveys for Aquatic Litter Pollution*. Environmental Research Laboratory – Corvallis, US Environmental Protection Agency, Corvallis, OR.
- Ribic, Christine A., Trevor R. Dixon, and Ivan Vining. 1992. *Marine Debris Survey Manual*. NOAA Technical Report. NMFS 108.

INTERNATIONAL COASTAL CLEANUP™ DATA CARD

Data collected during The Ocean Conservancy's International Coastal Cleanup™ is used to educate people and create solutions to the problems of solid waste and litter. Through partnerships with business, government, environmental groups, and citizens, we are helping to change the behaviors and practices that create debris. Thank you for being part of this very important process.



CLEANUP LOCATION

Type of Cleanup: Shoreline/Beach Underwater Location of Cleanup: State _____ County _____
 Zone or County Cleaned: _____ Beach Site Name: _____
 Today's Date: Month _____ Day _____ Year _____ Name of Coordinator: _____
 Number of People Working on This Card: _____ Distance Cleaned: _____ miles or _____ km
 Number of Trash Bags Filled: _____ Total Estimated Weight Collected: _____ lbs. or _____ kgs.

NAMES OF PARTICIPANTS IN YOUR GROUP

If you are interested in becoming a member of The Ocean Conservancy and/or joining our Ocean Action Network (OAN) to make your voice heard on important ocean conservation issues, please check the box(es) below your name and address. **Thank you for helping to protect our oceans!**

1. Name: _____ Age: _____ 3. Name: _____ Age: _____
 Address: _____ Address: _____
 City: _____ State: _____ City: _____ State: _____
 Zip Code: _____ Zip Code: _____
 Phone: (____) _____ Country: _____ Phone: (____) _____ Country: _____
 Email: _____ Email: _____
 I would like information on: The Ocean Conservancy The OAN I would like information on: The Ocean Conservancy The OAN

2. Name: _____ Age: _____ 4. Name: _____ Age: _____
 Address: _____ Address: _____
 City: _____ State: _____ City: _____ State: _____
 Zip Code: _____ Zip Code: _____
 Phone: (____) _____ Country: _____ Phone: (____) _____ Country: _____
 Email: _____ Email: _____
 I would like information on: The Ocean Conservancy The OAN I would like information on: The Ocean Conservancy The OAN

ENTANGLED ANIMALS: (Dead or Alive) List all entangled animals found during the Cleanup. Tell us what they were entangled in (fishing line, rope, net, etc.) _____

WHAT WAS THE MOST PECULIAR ITEM YOU COLLECTED?

The following national and international organizations endorse and/or support the International Coastal Cleanup:

- U.S. Environmental Protection Agency
- IUCN - The World Conservation Union
- Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific, and Cultural Organization (UNESCO)

Please return this card to your area coordinator or mail it to:
The Ocean Conservancy
 2029 K Street, NW, Suite 700
 Washington, D.C. 20006 USA
 Phone (202) 426-9609 Fax (202) 872-0619
www.oceanconservancy.org

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ITEMS COLLECTED

Human-made debris, trash and litter...

- Harms the environment & wildlife
- Causes communities to lose money
- Threatens human health & safety
- Looks bad!

Think about where all this debris comes from and how **we** can prevent it!



Please pick up all debris found on the beach. Record information on only the items listed below. Keep a count of your items using tick marks and enter the item total in the box. **Example:** Beverage Cans **444** _____

SHORELINE AND RECREATIONAL ACTIVITIES

(Debris from beach-goers, sports/games, festivals, litter from streets/storm drains, etc.)

<input type="checkbox"/> Bags	<input type="checkbox"/> Cups, Plates, Forks, Knives, Spoons
<input type="checkbox"/> Balloons	<input type="checkbox"/> Food Wrappers/Containers
<input type="checkbox"/> Beverage Bottles (plastic) 2 liters or less	<input type="checkbox"/> Pull Tabs
<input type="checkbox"/> Beverage Bottles (glass)	<input type="checkbox"/> 6-Pack Holders
<input type="checkbox"/> Beverage Cans	<input type="checkbox"/> Shotgun Shells/Wadding
<input type="checkbox"/> Caps, Lids	<input type="checkbox"/> Straws, Straws
<input type="checkbox"/> Clothing, Shoes	<input type="checkbox"/> Toys

OCEAN/WATERWAY ACTIVITIES

(Debris from recreational/commercial fishing and boat/vessel operations)

<input type="checkbox"/> Boat Containers/Packaging	<input type="checkbox"/> Fishing Nets
<input type="checkbox"/> Beach/Cleaner Bottles	<input type="checkbox"/> Light Bulbs/Tubes
<input type="checkbox"/> Buoys/Floats	<input type="checkbox"/> Oil/Lube Bottles
<input type="checkbox"/> Crab/Lobster/Fish Traps	<input type="checkbox"/> Pallets
<input type="checkbox"/> Cables	<input type="checkbox"/> Plastic Sheeting/Tarps
<input type="checkbox"/> Fishing Line	<input type="checkbox"/> Rope
<input type="checkbox"/> Fishing Lures/Light Sticks	<input type="checkbox"/> Snapping Bands

SMOKING-RELATED ACTIVITIES

Cigarettes/Cigarette Filters _____ Appliances (refrigerators, washers, etc.) _____
 _____ Batteries _____
 Cigarette Lighters _____ Building Materials _____
 Cigar Tips _____ Cars/Car Parts _____
 Tobacco Packaging/Wrappers _____ 55-Gal Drums _____
 _____ Tires _____

MEDICAL/PERSONAL HYGIENE

Condoms _____ DEBRIS ITEMS OF LOCAL CONCERN _____
 Diapers _____ (Identify and count 3 other items found that concern you)
 Syringes _____
 Tampons/Tampon Applications _____

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