

A Report on How Cruise
Ships Affect the
Marine Environment

May 2002

Cruise Control



Executive Summary

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Executive Summary

Cruise ships are big business. In 2000, the cruise ship industry contributed almost \$18 billion to the u.s. economy, generating more than 257,000 jobs.¹ Moreover, the industry has been growing 10 percent annually over the past five years, and almost 17 percent in 2000, doubling the previous high water mark set in 1986.² Between 2000 and 2005, the 16 largest cruise ship companies alone plan to bring into service more than 49 new ships costing about \$15 billion, with some 30 additional vessels in the planning stage.³

Cruise ships are literally floating cities. The largest, 1,017 feet in length, carries more than 5,000 passengers and crew and has its own zip code. It is larger than the u.s. Navy's largest aircraft carrier and holds five restaurants, seven bars, a conference center, three swimming pools, a 1,350-person theater, and an array of shops, stores, and entertainment facilities. (See Appendix 1.)

The impact of these floating cities – in both economic and environmental terms – is huge. In 1998, 223 cruise ships carried some 10 million passengers to and through some of the world's most beautiful and sensitive ecosystems. At least half of these trips occurred in North America. Some of the pollutants generated by these giant ships daily include as much as 37,000 gallons of oily bilge water; 30,000 gallons of sewage (or black water); 255,000 gallons of non-sewage wastewater from showers, sinks, laundries, baths, and galleys (or gray water); 15 gallons of toxic chemicals from photo processing, dry cleaning, and paints; tens of thousands of gallons of ballast water, bearing pathogens and invasive species from foreign ports; seven tons of garbage and solid waste; and air pollution from diesel engines at a level equivalent to thousands of automobiles.

Although cruise ships generate a tremendous amount of waste from the thousands of people on board, they are not subject to the same wastewater regulations that govern municipalities of comparable size. Under the Clean Water Act, cities must treat their wastes, limit the amount of pollution they discharge, and monitor and report on discharges from sewage treatment facilities. Yet cruise ships are not required to obtain Clean Water Act discharge permits, nor to monitor or report on their discharges. Gray water from on-board laundries, galleys, baths, and showers is essentially unregulated. And even where regulations are in place, enforcement is lax.

Given the phenomenal growth in the industry and the potential for increasing impacts on the marine environment, we believe that it is time to strengthen regulations for wastewater, garbage, and airborne discharges from cruise ships; to monitor compliance; and to strengthen enforcement to bring the industry in line with accepted pollution control practices. The purpose of this report is twofold: to call attention to the issues posed by a growing and largely unregulated industry and to suggest solutions that will protect valuable marine resources, both in u.s. waters and abroad.

Although cruise ships generate a tremendous amount of waste from the thousands of people on board, they are not subject to the same wastewater regulations that govern municipalities of comparable size.

Some of our suggestions include:

Reducing and regulating cruise ship discharges to improve water quality.

Cruise ship discharges should be regulated under u.s. environmental laws just like similar sources of pollution. Consequently, Congress and the Environmental Protection Agency (EPA) should repeal the exemption of gray water discharges under the Clean Water Act and ban the discharge of untreated sewage from cruise ships in u.s. waters. In addition, treated sewage and gray water should be discharged only while the vessel is underway at a minimum of six knots speed and 12 miles from shore. No cruise ship discharges should be permitted within marine protected areas or other sensitive and important ocean habitats such as marine sanctuaries, refuges, or parks. Finally, the EPA should establish water quality standards and allow states to establish no-discharge zones to protect special ocean sites.

Improving monitoring and inspection.

Cruise ship wastes should be comprehensively monitored, sampled, and reported. Congress should increase u.s. Coast Guard funding for more aerial surveillance and surprise inspections, and the EPA's expertise should be used to ensure proper monitoring and testing of discharges and pollution control equipment. The data gathered should be made available to the public so that citizens can make informed choices about cruise ship operations in their communities.

Strengthening enforcement mechanisms.

The u.s. Justice and State Departments should take measures to ensure that cruise ships flying foreign flags – as all cruise ships in u.s. waters currently do – are not permitted by their governments to violate u.s. environmental laws. Penalties and fines for violations should be increased to effectively deter scofflaws. Moreover, passengers, crew, and the public should be encouraged to report violations through educational materials and rewards.

Improving air quality controls.

The EPA should issue regulations to reduce emissions from cruise ship smokestacks in u.s. waters, and cruise ships should be encouraged to use local electrical grids when in port to reduce emissions. The EPA and the Coast Guard should also work with states to develop air-sampling programs. To reduce air emissions from ships worldwide, the United States should ratify Annex VI of the MARPOL Convention.

Developing education and training programs.

Cruise line companies should educate their passengers and crews on complying with u.s. and international anti-pollution laws, and develop “green” training and education programs for onshore operators and guides. Portside waste reception facilities should be assessed, and where inadequate, they should be improved to accommodate the large amount of trash generated by cruise ships.

Improving research and development.

All new cruise ships should be designed with the latest pollution control equipment to eliminate waste discharges into the marine environment. The cruise line industry should continue to research and develop state-of-the-art waste processing technologies and design and implement sampling programs to demonstrate that discharges are not harming the marine environment.

Cruising: A Primer

1.0

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- 1.01 The First 100 Years: Steamships to Love Boats
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It was not until 1950 that concern arose about the environmental impacts of ships or shipping accidents.

To better understand the current state of environmental controls over cruise ship discharges, it helps to look briefly at the history of the passenger-cruise ship industry and the environmental and safety laws and regulations that have evolved along with it.

1.01 The First 100 Years: Steamships to Love Boats

Samuel Cunard, considered by many to be the father of the passenger steamship, offered the first transatlantic steamship service in 1840. The Peninsular and Oriental Steam Navigation Company (the P&O) offered its first “cruises” to the Mediterranean around 1849. At the time, passengers were a second priority; the vessel’s primary purpose was to carry cargo and to service ports along the company line. Passengers created their own sightseeing itineraries at various destinations while the liner took on provisions, cargo, and additional passengers.

The first premier liners built solely for cruising service appeared at the beginning of the 20th century. After the sinking of the *Titanic* in 1912, a number of countries negotiated an international convention to establish safety requirements for human life at sea. But protecting the marine environment was not on the political radar screen.

In the early part of the 20th century, laws did evolve to reduce maritime casualties and to punish negligence. In 1934, for example, 134 people perished when a fire destroyed the passenger vessel *Morro Castle*. A federal court determined that the primary responsibility for the accident fell with the acting captain and the chief engineer. Liability was also extended to the executive vice president of the ship’s line company. All were sentenced to prison and fined the maximum penalty allowed by law at the time: \$10,000.¹

It was not until 1950, however, that some concern arose about the environmental impacts of ships or shipping accidents. In helping to prevent groundings and sinkings, ship safety regulations did yield small environmental dividends – reducing oil or hazardous cargo spills from such incidents. But issues such as oil pollution, sewage and gray water discharges, hazardous materials dumping, damage to fisheries, wildlife, and reefs, and air pollution were essentially ignored.

1.02 The Last 50 Years: Environmental Awareness and the New Behemoths of the Sea

When commercial jets entered the transoceanic market in 1958, ocean crossings were measured in hours rather than days. With fewer transoceanic passengers, many cruise ship lines faced economic demise. In an attempt to diversify, several lines developed cruise itineraries, and Holland America Line and Norwegian Caribbean (Norwegian Cruise Line) began to define the modern cruise market.

Another of the larger companies, Royal Caribbean Cruises Ltd. (RCCL), made its debut in 1970. Carnival Cruise Lines soon followed. During this period, cruise lines also made an effort to identify new markets, such as appealing to younger, first-time passengers. Cruise lines and airlines engaged in partnerships; airlines promoted passenger routes to warm-weather ports where cruise ships awaited, allowing vacationers to maximize their time on board.²



The U.S. State Department conducted a study of alleged dumping incidents in 1992 that revealed that nations with foreign-flagged vessels did not take action or respond to violations referred to them.

In the 1980s, Norwegian Cruise Line, Holland America Line, Carnival Cruise Lines, and Princess Cruises introduced new ships with shopping-mall-like amenities and recreational activities to attract the new consumers. Royal Caribbean Cruises Ltd. eclipsed all the competition in 1988 by launching the largest cruise ship of its time, the 880-foot-long, 73,192-gross-ton *Sovereign of the Seas*.

As the size of cruise ships grew, so did the public's awareness of environmental issues. In the United States, the early 1970s ushered in the National Environmental Policy Act, the Clean Air Act, the Endangered Species Act, and the Federal Water Pollution Control Act, more commonly known as the Clean Water Act (CWA). The CWA established the legal structure that regulates the discharge of pollutants into U.S. waters. It authorizes the Environmental Protection Agency (EPA) to establish effluent standards for discharges and requires national permits for discharging industrial and municipal wastes. Yet the Clean Water Act does not regulate sewage or gray water discharged from ships.*

*Two types of sewage effluents are "black water" and "gray water." Whereas black water contains solid human waste, gray water does not, and typically consists of water from activities such as showering, washing clothes, cleaning, and washing dishes.

During the 1960s and 1970s, a number of international marine environmental programs and conferences were initiated. These provide the framework for signatory nations' domestic marine environmental laws and include:

- The United Nations (U.N.) Conference on the Human Environment in Stockholm (1972);
- The International Convention for the Prevention of Pollution from Ships (1973; as modified by the Protocol of 1978, this important convention is known as MARPOL 73/78 and covers various sources of pollution from ships);
- U.N. Convention on the Law of the Sea (UNCLOS III; 1973 to 1982), which has not been ratified by the United States; and
- The London Dumping Convention (1975).

In 1997, MARPOL 73/78 was amended again to incorporate Regulations for the Prevention of Air Pollution from Ships (Annex VI). Finally, the United Nations International Maritime Organization (IMO) established the International Safety Management Code, or ISM, which establishes guidelines for passenger safety and pollution prevention.

Despite these efforts, the U.S. State Department conducted a study of alleged dumping incidents in 1992 that revealed that nations with foreign-flagged vessels did not take action or respond to violations referred to them.³ Consequently, the U.S. Coast Guard began to enforce pollution laws in federal waters between three and 200 nautical miles from U.S. shores. Yet this practice has severely stretched the Coast Guard's resources and has not provided thorough monitoring and enforcement. Compounding serious problems with environmental monitoring and control, the cruise industry continues to grow rapidly, although industry passenger traffic has slumped since the terrorist attacks on September 11, 2001.

1.03 Whose Ship Is It Anyway?

Cruise companies often choose to register or "flag" their ships outside the United States. This practice allows them to reduce tax liabilities, take advantage of more lenient safety standards, undergo fewer inspections, lower operating costs, and use non-domiciled crews. Hence, foreign-flag ships are often referred to as "flags of convenience." According to the International Transport Workers' Federation (ITWF), most people who work on foreign-flag or "flag-of-convenience" ships are also not members of a trade union. The nations that offer flags of convenience include Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Burma, Cambodia, Canary Islands, Cayman Islands, Cook Islands, Cyprus, Germany, Gibraltar, Honduras, Lebanon, Liberia, Luxembourg, Malta, Marshall Islands, Mauritius, Netherlands Antilles, Panama, Sri Lanka, St. Vincent and the Grenadines, Tuvalu, and Vanuatu.

In at least one case, a flag of convenience was invoked in an attempt to evade prosecution under U.S. law.⁴ During a criminal trial in Miami in 1998 involving the falsification of records and the intentional bypassing of pollution control equipment, Royal Caribbean Cruises Ltd. argued that the United States lacked jurisdiction in the case because the *Sovereign of the Seas* was flagged in Liberia.⁵ Royal Caribbean attorneys produced a diplomatic note from the Liberian Embassy in Washington, DC to the State Department asserting that Liberia had primary jurisdiction, and that it had determined there was insufficient evidence of crimes. Liberia asked that the case be dismissed.⁶ A judge rejected Liberia's claim, and Royal Caribbean ultimately pled guilty and paid millions of dollars in criminal penalties.

Today, many cruise and shipping companies register their ships in flag-of-convenience countries but register their corporate financial instruments elsewhere. The industry's ability to capitalize on governmental complacency often associated with flag-of-convenience countries and the strict secrecy laws associated with offshore tax havens make it difficult for federal investigators to gather information relevant to environmental crimes and to enforce penalties.

1.04 Destinations of Choice

Cruise lines companies are constantly evaluating market conditions, embarkation and debarkation facilities, and tour destinations. China, India, and Southeast Asia are some of the new markets under evaluation. To fill their increasing capacity, cruise lines are looking for new markets around the world.

The Caribbean and Western Caribbean continue to rank as the first- and second-most-visited destinations in the world. Alaska, Bahamas, western Mexico, and Bermuda rank fourth, sixth, eighth, and ninth, respectively. More than 62 percent of world cruise destinations carry passengers who embark from, or debark at, a u.s. port. (See Tables 1 and 2.)

Table 1: Top Ten Caribbean Destinations (By Passenger Arrival)

DESTINATION	1997	DESTINATION	1996
BAHAMAS	1,744,336	BAHAMAS	1,687,088
U.S. VIRGIN ISLANDS	1,618,956	U.S. VIRGIN ISLANDS	1,316,425
PUERTO RICO	1,236,367	PUERTO RICO	1,025,065
ST. MAARTEN	885,956	CAYMAN ISLANDS	771,068
CAYMAN ISLANDS	865,383	JAMAICA	658,178
JAMAICA	711,951	ST. MAARTEN	657,351
BARBADOS	517,888	GUADELOUPE	589,544
GUADELOUPE	470,054	BARBADOS	509,975
MARTINIQUE	366,833	MARTINIQUE	408,425
ST. LUCIA	310,213	ARUBA	316,751

Table reprinted with permission from the Florida-Caribbean Cruise Association.

Table 2: Top Ten Ranked Cruising Regions Worldwide (Based on Available Beds)

RANK	ITINERARY	1997	PERCENT OF WORLD	1998	PERCENT OF WORLD
1	CARIBBEAN	10,429,047	26.48	12,148,606	26.97
2	WESTERN CARIBBEAN	5,557,772	14.11	5,774,669	12.82
3	MEDITERRANEAN	3,286,598	8.35	5,092,530	11.53
4	ALASKA	3,625,946	9.21	3,792,779	8.42
5	EUROPE	2,821,643	7.17	3,716,203	8.25
6	BAHAMAS	3,115,496	7.91	2,891,352	6.42
7	PANAMA CANAL	2,817,313	7.15	2,612,788	5.80
8	WESTERN MEXICO	1,887,210	4.79	2,421,126	5.37
9	BERMUDA	1,103,553	2.80	1,094,982	2.43
10	SOUTH AMERICA	482,506	1.23	943,392	2.09

Compiled by the Cruise Line International Association and used with permission.

Unsolicited Contributions:

2.0

Waste Streams and Other Impacts

- 2.01 Oil Pollution
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Our oceans deserve the same protections as our rivers, lakes, and coastal waters. Black water discharges from cruise ships should be regulated under the same Clean Water Act requirements as onshore sewage discharges.

2.0 Unsolicited Contributions: Waste Streams and Other Impacts

Today's cruise lines – and the passengers they carry – generate an enormous amount of waste. Combining waste estimates of the United Nations International Maritime Organization (IMO) with current bed-day* statistics reveals that the cruise industry generates more than 400 million pounds of waste annually (Table 3, below). This chapter reviews cruise ship waste streams, the management of these waste streams by the industry, and the current federal regulatory programs that govern these waste streams.

Table 3: Passenger Waste-Generating Potential of Cruise Ships By Geographical Destination/Application

DESTINATION	1995 TOTAL BED DAYS*	1995 WASTE IN KILOS	2000 TOTAL BED DAYS*	2000 WASTE IN KILOS	1995-2000 % CHANGE
CARIBBEAN	15,254,551	53,390,928	21,510,142	75,285,497	41.01
MEDITERRANEAN	3,477,729	12,172,051	6,277,064	21,969,724	80.49
ALASKA	3,008,146	10,528,511	4,197,332	14,690,662	39.53
BAHAMAS	2,761,224	9,664,284	3,200,346	11,201,211	15.90
TRANS-CANAL	2,277,201	7,970,204	2,573,444	9,007,054	13.01
MEXICO WEST	1,754,312	6,140,092	2,680,934	9,383,269	52.82
EUROPE	1,582,589	5,539,062	3,744,693	13,106,425	136.6
BERMUDA	1,094,707	3,831,475	988,391	3,459,369	(9.71)
TRANSATLANTIC	658,928	2,306,248	1,015,625	3,554,688	54.13
HAWAII	601,542	2,105,397	857,390	3,000,865	42.53
SOUTH PACIFIC	574,218	2,009,763	1,155,217	4,043,260	101.18
SOUTHEAST ASIA	430,123	1,505,431	244,620	856,170	(43.13)
AFRICA	347,432	1,217,073	502,773	1,759,706	44.59
CANADA – NEW ENGLAND	334,735	1,171,573	1,107,689	3,876,912	230.92
FAR EAST – ORIENT	327,009	1,144,532	201,582	705,537	(38.36)

Bed-day information from 2000 Cruise Line International Destination Analysis. Used with permission. Waste generated calculated at 3.5 kilos/passenger/day per IMO estimates.

*A common measurement of occupancy used by the cruise line industry, "bed days" are calculated by multiplying the number of beds occupied by the number of days.

2.01 Oil Pollution

Cruise ships, like nearly all vessels, generate oil, or petroleum hydrocarbon, pollution. Oil and oily waste discharges can result from collisions, groundings, fueling operation spills, and bilge pumping. But it is estimated that nearly one-third of the more than 300 million gallons of petroleum products that reach the world's oceans each year is the result of marine transportation discharges unrelated to collisions and other accidents.¹

Much is known about the adverse effects of oil on marine mammals, sea birds, fish, and plankton and other invertebrates, and on wetland and mudflat plants and animals, coral reefs, and mangroves. Data from oil spills and laboratory research indicate that the egg and larval forms of many species are especially sensitive to petroleum hydrocarbons, even in extremely small quantities and at low concentrations, and that impacts on many life stages of numerous species, especially birds and fur-bearing marine mammals such as seals, sea lions, and sea otters, can be severe. And long-term exposure to low concentrations can

sometimes be as harmful as acute, short-term exposure to higher concentrations. Scientists have observed such impacts in harbors with poor flushing action or at oiled beaches or marshes, where plants or animals are continuously exposed to discharges of oil and oily bilge water over several years.^{2,3}

Oil leaks can spring from a variety of places on a cruise ship. Spills and leaks occur during the use and transfer of fuels and lubricants for the vessel's propulsion and electrical generation systems, pumps, and other on-board mechanical systems. Residual oil eventually mixes with bilge water and collects at the bottom of the vessel in the bilge. On most ships, oily bilge water is pumped through an oil-water separator capable of reducing oil concentration to the legal limit – fewer than 15 parts per million (ppm). The remaining oily bilge water is discharged overboard or offloaded to a treatment facility while the ship is in port. The Coast Guard requires vessels to keep an oil record book documenting the discharge or disposal of all oily waste, including bilge water.

Within u.s. waters, oil and hazardous substances are regulated under the Clean Water Act and the Oil Pollution Act, which require that oily wastes discharged within 12 nautical miles of shore have an oil content fewer than 15 ppm. Oily bilge water discharged from 12 to 200 miles (the boundary of the u.s. Exclusive Economic Zone) offshore must have an oil content less than 100 ppm. Cruise ships can generate 1,300 to 37,000 gallons of oily bilge water per day, depending on the size and age of the ship.^{4,5} Royal Caribbean Cruises Ltd. reports that approximately half of the total is treated and discharged at sea; the remainder is retained in on-board tanks and treated on shore when the ship reaches port. However, reporting is not required, and reports were not available from other companies.

In 1994, u.s. Coast Guard investigators discovered that Royal Caribbean Cruises Ltd. engineers constructed illegal plumbing lines to bypass oil pollution treatment equipment, which were removed during Coast Guard inspections and reinstalled after the ship passed inspection. In 1998, RCCL pled guilty to seven felony counts for conspiracy to discharge hazardous wastes and obstruct justice and was fined \$8 million. The following year, RCCL was fined another \$18 million after pleading guilty to a 21-count indictment for the fleetwide practice of discharging oil-contaminated bilge water and contaminated gray water and for making false statements.⁶ On April 19, 2002, the u.s. Attorney for the Southern District of Florida reported that Carnival Cruises was ordered to pay \$18 million in fines and community service for illegally discharging oily waste into the ocean and for falsifying records between 1996 and 2001.

Of the 87 cases of illegal discharge by foreign-flagged cruise vessels during 1993 through 1998, 93 percent involved petroleum products.⁷ Our review of the Coast Guard's oil pollution database on u.s. passenger vessels shows 76 percent more petroleum pollution violations in 1998-1999 than in 1992-1993. However, because the level of effort by Coast Guard enforcement programs declined significantly during this period, the trend may be even more pronounced than figures show.

Until inspectors employ surprise compliance inspections to discover violations such as the illegal bypass of oil separators in the RCCL case, or illegal dumping in the Carnival case, enforcement will likely remain inadequate. Furthermore, at present, neither the Coast Guard nor any other federal regulatory agency is required to monitor effluent or receiving water to determine whether on-board treatment devices are, in fact, discharging within manufacturer's specifications or complying with water quality regulations. Even the best-engineered pollution control devices require regular monitoring to ensure that they are operating as designed. For this reason, the state of Alaska recently adopted measures that require the monitoring and reporting of cruise ships wastes in state waters. Similar measures are needed in all U.S. waters.

2.02 Sewage

Sewage, also called black water, consists of wastewater generated from toilets and medical facilities.⁸ Sewage on ships is typically diluted with smaller volumes of water than is sewage on land (three quarts per flush compared with three to five gallons), and ship sewage is therefore more concentrated.

Human sewage can carry enteric bacteria, pathogens, diseases, viruses, the eggs of intestinal parasites, and harmful nutrients.⁹ Ingesting contaminated fish or direct exposure to water contaminated with sewage pose health risks for humans. Bivalve mollusks (oysters and clams) and other filter-feeding marine organisms often inhabit waters with the greatest concentrations of nutrients from organic wastes, and they absorb high levels of these pollutants. Discharges of untreated or inadequately treated sewage from ships can cause bacterial and viral contamination of commercial and recreational shellfish beds, producing serious risks to public health.

Estimates of cruise ship sewage production range from five to 10 gallons per person per day, or 15,000 to 30,000 gallons per day for a typical cruise ship carrying 3,000 passengers and crew.^{10,11} The cruise line industry reports that its policy is to discharge treated black water or gray water only when underway and not while in ports. But it is difficult to confirm whether practice follows policy. To its credit, however, the industry has offered to work with regulators to identify especially sensitive areas where wastewater should not be discharged, and the industry has agreed not to dump within 10 miles of certain Alaskan ports.¹²

Unlike the discharge of land-based sewage and other pollutants, the Clean Water Act does not regulate sewage discharged by ships under the National Pollution Discharge Elimination System (NPDES) Permit Program. Instead, the CWA requires vessels to install and use Coast Guard-approved marine sanitation devices (MSDs) capable of treating or holding raw sewage. Federal regulations prohibit the discharge within three nautical miles of shore of untreated or inadequately treated sewage with a coliform bacterial count greater than 200 colonies per 100 milliliters, or total suspended solids exceeding 150 mg/100 ml. Beyond the three-mile limit, however, ships can discharge raw sewage whenever they wish, which can wash back to shore.

Until now, very little research existed documenting the actual performance of MSDs on cruise ships. Recently, however, the state of Alaska conducted a study under the oversight of the U.S. Coast Guard and the Alaska Department of Environmental Conservation.¹³ Samples of treated black water and gray water registered fecal coliform levels as high as 9 to 24 million colonies per 100 milliliter sample, exceeding federal limits by 10,000 to 100,000 times. None of the 22 cruise ships tested was in full compliance with all black water standards, and 75 percent of the “treated” sewage samples exceeded federal standards for fecal coliform. The Coast Guard found that the marine sanitation devices on many of the ships were either being operated incorrectly or were improperly maintained. But even when properly maintained and operated, many MSDs still do not adequately disinfect sewage before discharge. During the summer of 2001, nearly half of the bacterial and suspended solids samples collected from five ships exceeded the amount allowed by state water quality standards.

Cruise ships currently operating in Alaska and elsewhere generally collect and treat sewage in one of two varieties of MSDs: a biological system employing aeration and clarification to biologically digest the sewage, or a chemical treatment system that masticates the waste and adds up to eight times the volume of salt water and chlorine. Following treatment, the waste is pumped into holding tanks, where it is usually combined with the ship's gray water. Some of these tanks can hold as much as 396,000 gallons, or one to three days' production of gray water and treated black water. These wastes are held until discharged overboard. Since chlorine is itself a highly toxic substance, especially to the eggs and larvae of many marine organisms, the chlorine that enters the receiving water upon discharge of the waste can have significant environmental impacts.¹⁴

Although Coast Guard inspectors certify waste treatment equipment during their quarterly inspections, they are not required to test discharges to determine whether or not they comply with mandated water quality standards. Furthermore, budget constraints and lack of personnel appear to have reduced the Coast Guard cruise ship inspection and surveillance programs to a minimal presence; only a few hours per year are devoted to checking each cruise vessel for its compliance with environmental regulations. Moreover, cruise line company officials and crew know of these inspections weeks, and even months, in advance, enabling them to prepare ahead of time. According to U.S. Justice Department officials, inadequate Coast Guard oversight and environmental law enforcement have allowed some cruise ships to operate with chronically malfunctioning or inoperable pollution treatment equipment. These enforcement problems are reflected by reports of chronic illegal discharges on 69 separate vessels operated by 42 different cruise ship companies between 1993 and 1998, some of which involved falsified records or failure to keep required records altogether.¹⁵

Our oceans deserve the same protections as our rivers, lakes, and coastal waters. Black water discharges from cruise ships should be regulated under the same Clean Water Act requirements as onshore sewage discharges. That way, cruise ships would be subject to the same treatment, monitoring, sampling, and reporting requirements. Moreover, the provisions of the Clean Water Act that allow the discharge of untreated sewage beyond three miles offshore should be modified to prohibit untreated sewage from being discharged in all U.S. waters. Treated sewage as well as gray water (see below) should be discharged only while the vessel is underway and doing at least six knots speed to disperse the

effluent and while the vessel is at least 12 miles from shore. Furthermore, no treated sewage or gray water should be discharged within sensitive ocean waters such as marine protected areas, marine sanctuaries, national parks, or refuges. Finally, the EPA should adopt regulations currently being held up by the Bush Administration to implement Executive Order 13158 on Marine Protected Areas, issued by President Clinton in May 2000. The draft regulations provide for the designation of special ocean sites that warrant additional pollution protection, adoption of marine water quality standards by the EPA, and the designation of no-discharge zones by states to reduce the impacts of cruise ships on sensitive ecosystems.¹⁶

2.03 Gray Water

Gray water consists of non-sewage wastewater, including drainage from dishwashers, showers, laundry, baths, galleys, and washbasins. It can contain pollutants such as fecal coliform, food waste, oil and grease, detergents, shampoos, cleaners, pesticides, heavy metals, and, on some vessels, medical and dental wastes.^{17,18} These constituents contain inorganic compounds as well as harmful substances such as nitrogen and phosphorous, which deplete the dissolved oxygen in water necessary to support life. Gray water represents by far the largest category of liquid waste generated by cruise ships. Estimates of gray water production range from 30 to 85 gallons per day per person, or 90,000 to 255,000 gallons per day for a typical cruise ship. Despite the toxicity of many of its constituents, gray water is not currently regulated under U.S. law or MARPOL. For this reason, some states, such as Alaska, are initiating their own regulations.

At recent meetings of the IMO Marine Environmental Protection Committee, U.S. representatives noted that certain gray water pollutants might pose greater threats to public health than sewage. For example, in 1998, Royal Caribbean Cruises Ltd. pled guilty to multiple charges of the fleetwide practice of illegally disposing of pollutants through its ships' gray water systems. Industry officials report they are now identifying and segregating hazardous wastes to prevent them from entering gray water waste streams. But the effectiveness of these measures is unknown, because no national regulations exist to limit or monitor gray water discharges.

Gray water samples taken by the state of Alaska found substantial contamination from fecal coliform bacteria, heavy metals, and dissolved plastics.¹⁹ Gray water from the ship's galley and sink waste streams tested higher for fecal coliform than the ship's sewage lines. Possible reasons have been cited for the contamination: the washing of contaminated food in the galley; unsanitary practices by ship personnel; the buildup of substrates in the plumbing that serve as sites for bacterial growth; and gray water storage time (ships are designed for open sea operation and the continuous discharge of gray water). Still, none of these conclusions adequately explains the gray water contamination levels.

As a result of these impacts, the United States recommended that gray water be subject to international regulation, even though gray water discharges in U.S. waters remain essentially unregulated. The U.S. General Accounting Office has proposed that the Coast Guard review the regulatory definition of gray water to "evaluate whether the current regulations adequately address the potential environmental hazards [of gray water] to marine life."²⁰ In addition, the Bluewater Network, The Ocean Conservancy, and 52 other groups petitioned the EPA in

March 2000 to more narrowly define and regulate gray water to reduce the impacts of gray water discharges from cruise ships on the marine environment.²¹ In response to the petition, EPA issued a white paper to provide preliminary information on cruise ship waste management practices and preliminary recommendations with regard to the petition. It conducted three public hearings in Los Angeles, Juneau, and Miami at which The Ocean Conservancy and other interested organizations, and the industry, presented comments. However, as of March 2002, EPA had still not issued any new regulations. These regulations must be issued as expeditiously as possible to control gray water pollution from cruise ships, and a ban on gray water discharges into sensitive ocean areas, similar to the ban proposed for black water in the section above, should be implemented.

2.04 Hazardous Wastes

Although the quantities of hazardous wastes generated on cruise ships are small, their toxicity to sensitive marine organisms can be significant. Many of these materials – such as photo processing chemicals, which contain silver; print shop wastes that include hydrocarbons, chlorinated hydrocarbons, and heavy metals; dry cleaning fluids containing perchlorethylene (PERC) – are rarely found on other commercial vessels and therefore receive little regulatory attention. Cruise ships also use and dispose of paint waste, solvents (including turpentine, benzene, xylene, methyl ethyl ketone, toluene), photo copying and laser printer cartridges, fluorescent and mercury vapor light bulbs, lead-acid, nickel-cadmium, lithium, and alkaline batteries, and unused or outdated pharmaceuticals.

A typical cruise ship with 3,000 passengers and crew generates approximately 15 gallons of photo processing chemicals, one and a half gallons of PERC and other chemicals, and one and a half gallons of paint waste per day.²² Some of these materials, such as PERC, are known carcinogens and can cause serious liver, kidney, and central nervous system damage, while others, such as the silver compounds in photo chemicals, can bioaccumulate* and become toxic to shellfish.²³ Also, a highly toxic anti-fouling paint, tributyltin (TBT), is commonly used on the hulls of cruise ships and other large vessels. Alaska passed a law in 2000 (S.B. 266) banning vessels painted with TBT from entering state waters.²⁴

Although it is illegal to discharge hazardous material through a ship's gray water, the Resource Conservation and Recovery Act (RCRA) does not clearly address the management and disposal of hazardous wastes on cruise ships. There is uncertainty with respect to whether cruise ships are large or small generators of hazardous wastes, and where the "point of discharge" is located (the ship or the port). These ambiguities in the law must be resolved. The Bluewater Network, the Ocean Conservancy, and more than 50 other organizations petitioned the EPA in March 2000 to strengthen the regulations and clarify requirements for permits, records, and reports for hazardous and toxic wastes generated by cruise ship activities.

*Substances "bioaccumulate" when they are absorbed by, but cannot be expelled by, living organisms.

The cruise line industry has developed guidelines entitled *Cruise Industry Waste Management Practices and Procedures* (see Appendix 3) to encourage ships to comply with u.s. laws and international treaties.²⁵ The procedures call for incinerating all hazardous waste materials on board or returning wastes to shore for recycling or disposal in compliance with regulations.^{26,27} But the effectiveness of these procedures is hard to measure, since they are entirely voluntary, and since neither federal nor state oversight programs are adequate to verify ships' compliance with regulations.

Congress and the EPA should clarify that toxic and hazardous cruise ship waste discharges from dry cleaning operations, photo laboratories, paints, copying machines, and pharmacies are regulated under the Resource Conservation and Recovery Act and may not be discharged into u.s. waters.

2.05 Ballast Water

Cruise ships and other large vessels such as tankers and bulk cargo carriers use a tremendous amount of ballast water to stabilize the vessel. Ballast water is often taken on in the coastal waters of one region and discharged at the next port of call. It is estimated that ballast water transports at least 7,000 different marine species each day around the world, and that ballast water is discharged into u.s. waters at a rate of 2 million gallons per hour.²⁸

Ballast water discharges invasive species into some of the most sensitive waters in the world and is the leading source of invasive species in u.s. marine waters. Invasive species are the second leading cause, after habitat destruction, of biological diversity loss; competition with and predation by invasive species affects at least 49 percent of endangered or threatened species in the United States.^{29,30}

The rate of known introductions of invasive species into u.s. waters has increased exponentially during the past 300 years, and controlling the impacts of invasive species is costing Americans billions of dollars per year. Costs for controlling and mitigating zebra mussels alone are estimated to be \$3 billion annually. San Francisco Bay, with more than 230 invasive species, is already one of the most invaded estuaries in the world, and it faces more invasions from planned increases in cruise ship traffic. It is estimated that more than 3 million gallons of ballast water are discharged into the bay each day, and, on average, one new invasive species has been introduced into the bay every 14 weeks since 1961.³¹

In addition to the loss of biodiversity and native species, ballast water also poses serious public health risks. Cholera is transported with ballast water, and an epidemic strain from South America was discovered in fish and shellfish in the Gulf Coast. A recent study by the Smithsonian detected cholera in 14 of the 15 vessels sampled in the Chesapeake Bay.³² Ballast water discharges also release toxic algal blooms. These include red tides and other dinoflagellates such as *Pfiesteria piscicida*, which can produce dangerous neurotoxins that cause massive fish kills and accumulate in shellfish causing illness and sometimes death in people who consume them.³³

Despite these massive impacts, EPA regulations currently exempt ballast water discharges, “or any other discharge incidental to the normal operation of a vessel,” from Clean Water Act permitting requirements.³⁴ In January 1999, a petition was filed by The Ocean Conservancy and other conservation organizations, fishing groups, Native American tribes, and water agencies asking the EPA to repeal its regulation exempting ballast water discharges. The petition asserts that the ballast water must be regulated as the “discharge of a pollutant” under the Clean Water Act National Pollutant Discharge and Elimination System (NPDES) permit program. When the EPA had still not responded to our petition after more than two years, The Ocean Conservancy and other groups filed suit asking for a response. In January 2002, the court ordered the EPA to grant or deny the petition within 30 days.³⁵ EPA is appealing and seeking a stay of the decision. EPA should recognize that this loophole in the Clean Water Act is a leading threat to biodiversity and eliminate the exemption for ballast water discharges.

To address the problem of invasive species entering California waters via ballast water, and because of EPA’s failure to take meaningful action, California enacted a law specifically prohibiting ballast water from outside the Exclusive Economic Zone (200 miles from shore) from being discharged into state waters (three miles from shore). The law requires ships to conduct an exchange of ballast water at least 200 miles offshore or treat the ballast water prior to being discharged into California waters.³⁶ In response, one cruise line (Princess) has installed a pilot ballast water treatment system on one of its vessels and is looking into installing the system on other vessels. However, environmental groups in California recently filed suit against the cruise lines for allegedly violating the state’s ballast water law, based on required reporting information supplied to the State Lands Commission.

2.06 Solid Waste

Cruise ships also generate huge volumes of non-hazardous solid waste. Historically, much of this waste stream was simply discarded at sea – often with very serious consequences. Worldwide, at least 267 species have been affected by marine debris including 86 percent of all sea turtle species, 44 percent of all seabird species, and 43 percent of all marine mammal species, as well as numerous fish and crustaceans.³⁷ Entanglement in fishing line, wire, and plastic mesh and strapping, and ingesting plastic, Styrofoam, and other materials represent serious threats to marine life; they can damage an animal’s digestive tract, cause starvation by blocking food intake, and inhibit growth, molting, reproduction, buoyancy, and, ultimately, survival. The Coast Guard estimates that ingestion of and entanglement in marine plastic debris is responsible for the deaths of more than 1 million birds and 100,000 marine mammals each year.³⁸

The magnitude of the solid waste problem is staggering – about two billion pounds of trash is dumped into the world’s oceans each year. Some 24 percent of the solid waste generated by ships comes from cruise ships.³⁹ For a typical cruise ship (3,000 passengers and crew), about 50 tons of solid waste are generated during a one-week cruise.

Today, many cruise ships retain some types of solid waste on board, such as glass bottles, cans, plastic waste, and cardboard, and recycle or dispose of such waste on land at the end of each voyage. Other plastics, paper, cardboard, and combustibles (representing 75 to 85 percent of a ship's total solid waste), including food waste, are incinerated at sea; the resulting ash is disposed into the ocean.⁴⁰

U.S. law prohibits the disposal of all garbage within three miles of the coast and enforces MARPOL Annex V, which prohibits the dumping of garbage from three to 25 miles offshore unless it is ground to pieces smaller than one inch. Disposing of plastics overboard is now prohibited in all U.S. waters and in the waters of all signatory countries to MARPOL Annex V. (See Appendix 2 for a listing of signatory nations.)

Between 1993 and 1998, the GAO cited six incidents involving illegal disposal of garbage or plastic by cruise ships. In one incident in February 1993, the crew of the *Regent Rainbow* knowingly discharged 30 to 40 plastic bags of garbage within the U.S. Exclusive Economic Zone (three to 200 miles offshore).⁴¹ As a result, a \$250,000 fine was levied against Regency Cruises, Inc., the ship's owner. Regency was also required to spend an equal amount on equipment to reduce garbage on its fleet and to implement an environmental compliance plan.

Cruise line companies should educate their passengers and crew on compliance with MARPOL and U.S. solid waste requirements and develop environmental training and education programs for onshore operators and guides. The adequacy of portside waste reception facilities should be assessed, and where inadequate, improved to accommodate the large amount of trash generated by cruise ships.

Image by: Wernher Krutein / photovault.com



2.07 Air Pollution

Air pollution from cruise ships is generated by diesel engines that burn high sulfur content fuel, producing sulfur dioxide (SO_x), nitrogen oxide (NO_x), and particulate matter in addition to carbon monoxide, carbon dioxide, and hydrocarbons. Shipboard incinerators also burn large volumes of garbage, plastics, and medical waste, producing dioxin, furans, and other toxics.

Emissions from ships in general are a significant source of air pollution. According to researchers at Carnegie Mellon University, commercial shipping (including cruise ships) contributes about 14 percent of global nitrogen emissions and 16 percent of global sulfur emissions.⁴² Ships in general account for about 31 percent of the total sulfur inventory of California.

The EPA estimates that commercial shipping contributes more than a quarter of a billion pounds of NO_x into the atmosphere in the United States, about 42 percent of the total U.S. emissions.⁴³ The nitrogen in NO_x can also contribute to the over-enrichment of waters, dead zones, and algal blooms. Sulfur emissions play a very important role in global climate change. Smog and particulate matter account for 15,000 premature deaths, one million respiratory problems, four million asthma attacks, and thousands of cases of aggravated asthma, especially in children, in the United States each year.⁴⁴ Although the EPA admits that large marine engines contribute substantially to local air pollution in U.S. port areas, it has failed to establish adequate emission limits for NO_x emissions from large Category 3 vessels (the largest size of marine vessel engines, including those used by cruise ships).

There is an urgent need for tighter controls over vessel air emissions in general and cruise ship emissions in particular. In 1996, the state of Alaska discontinued air monitoring of cruise ships as a result of budget cuts. Responding to citizen complaints about dirty air, an EPA chief inspector was called in to test emissions. He found exhaust plume particulate matter violations each time he tested. During one inspection, each of three vessels docked in Juneau was producing emissions in excess of regulations. In the spring of 2000, the EPA cited Holland America Line-Westours Inc., Princess Cruises, Celebrity Cruises, Norwegian Cruise Line, Carnival Cruise Lines, and World Explorer Cruises for violating Alaska's air quality standards.

Responding to continuing complaints about cruise line air emissions, Alaska created a Cruise Ship Air Emissions Working Group made up of representatives of the state government, the cruise lines, EPA, Coast Guard, several non-governmental organizations, and numerous affected communities. The working group's tasks were to characterize the type and quantity of air pollutants emitted by cruise ships, to determine the public health and environmental impacts of those emissions, and to find solutions. As a first step, it developed an ambient air quality monitoring program that began in the summer of 2000. In only the first two months of the state's monitoring for visible smoke stack emissions, 30 violations were detected.⁴⁵

While the working group's air quality monitoring program has helped uncover violations, it has not contributed to enforcement. Although the cruise ship industry has been willing to perform the tests, it has insisted that the state may not use the information to penalize the ship owners and that the names of violating ships be withheld from the public. Although the state can use its own data in enforcing regulations and prosecuting violations, this "enforcement shield" arrangement obviously hinders such prosecutions.

In 1996, Glacier Bay National Park and Preserve implemented a cooperative agreement with the state of Alaska that allows the National Park Service to adopt certain state air quality standards under federal law. The Park Service also worked with the u.s. Coast Guard to create regulatory controls on cruise ships in Glacier Bay and developed the park's vessel management plan. As a result, two cruise ships were issued administrative violations for exceeding stack emissions standards set for Alaska. Norwegian Cruise Lines' *Norwegian Wind*, cited on July 16, 1999, and World Explorer Cruise Lines' *The Universe Explorer*, cited on June 20, 1999, will be prohibited from re-entering Glacier Bay if a second administrative violation is issued within three years.

Nevertheless, in March 2002, the National Parks Conservation Association listed Glacier Bay as one of the ten most endangered national parks in the United States, primarily because of cruise ship air emissions, the killing of a pregnant humpback whale by a cruise ship in 2001, and legislation sponsored by Alaskan Senator Ted Stevens requiring the National Park Service to allow an increase in cruise ship traffic in the park, pending a study of the impacts of cruise ship traffic.

The EPA was petitioned by Bluewater Network in 1999 to enact tougher emission standards for large vessels and cruise ships.⁴⁶ The petition alleges that the agency has failed to carry out its mandate to promulgate air quality regulations for cruise ships and other Category 3 marine engines and instead focused its attention on land-based industries and vehicle emissions. The petition requests that the EPA establish enforceable standards for NO_x, SO_x, and particulate matter from the Category 3 marine engines used by cruise ships. Bluewater filed suit in February 2000, when EPA failed to act on the petition, and the case was settled in October 2000. In the settlement, EPA agreed to propose new rules to regulate NO_x emissions from ships by April 30, 2002, and to issue a final regulation by January 31, 2003, unless Annex VI of MARPOL, which regulates air pollution from ships internationally, is ratified by at least 15 nations, including the United States.

Despite the recent activities in Alaska, air quality impacts from vessels have received scant attention. Although Annex VI of the MARPOL treaty limits NO_x emissions to some extent (by about 11 to 17 percent), but technologies exist (such as Selective Catalytic Reduction Units) capable of reducing NO_x by 95 percent. Moreover, Annex VI has been ratified only by three nations (as of January 2001), and the u.s. Senate has not yet even been requested to consider it. Annex VI cannot take effect until it is ratified by at least 50 percent of the world's shipping tonnage. Clearly, IMO and MARPOL cannot be relied upon to effect the needed reductions in global ship emissions.

The EPA should issue regulations to reduce air emission from cruise ships in U.S. waters, and the United States should ratify Annex VI of the MARPOL Convention to reduce air emissions from ships worldwide after the EPA cleans up its own act and issues the NOx regulations. The EPA and the Coast Guard should work with states to develop air-sampling programs, and the cruise line industry should work to install the latest pollution control equipment.

2.08 Damage to Coral Reefs

The 7,000 coral reefs throughout the world are under severe threat from a host of problems, including dredging, construction, sewage wastes, fertilizers, toxic and hazardous materials, recreational misuse, global warming, and damage from anchors and ship collisions.⁴⁷ Jamaica and Florida, two major cruise destinations, provide telling examples. Today, only five percent of the reefs surrounding Jamaica support living coral, compared to 60 percent in 1982. In the Florida Keys, one of the Western Hemisphere's largest reef tracts is under tremendous stress from the two and a half million visitors who come each year to fish, dive, and boat. About 90 percent of Florida's coral reefs are believed to be dead or dying.⁴⁸

Two current examples demonstrate the damage that cruise ships can do to such delicate and irreplaceable ecosystems. In George Town, Grand Cayman, government scientists report that more than 300 acres of coral reef have been lost to cruise ship anchors.⁴⁹ A Norwegian Cruise Line ship ran aground, destroying 80 percent of a coral reef in a national park off Cancun, Mexico.⁵⁰ With cruise ships making some 400 visits to Cancun each year, the potential for further accidents and environmental damage is extremely high.

A 1987 study found that, in the U.S. Virgin Islands National Park, a single boat with 25 feet of anchor chain could damage 2,000 square feet of bottom coral at a single site.⁵¹ According to the same study, 30,000 boats anchored in the park that year. If these small boats can damage coral reefs to such an extent, one can imagine the tremendous damage that can be caused by the massive anchors and chains used by huge cruise ships.

2.09 Sedimentation

Dredging for constructing and expanding ports, resorts, marinas, and shipping channels poses serious environmental threats to coral reefs, fisheries, mariculture, and coastal ecosystems. Sediment loading from dredging and runoff is one of the biggest potential sources of reef damage and deterioration in the Caribbean and the Pacific.⁵² The resulting increase in turbidity reduces the light necessary for photosynthesis and can cause severe damage to coral colonies, sea grass beds, and mangroves. As these habitats deteriorate, the species that use them for protection, spawning, and survival decline.

Dredging also redistributes and re-suspends pollutants that may have settled or accumulated in the dredged material. Since port construction and expansion, as well as maintenance dredging, often occur in highly industrialized ports and waterways, sediment generated by these activities often contains toxic levels of petroleum hydrocarbons, heavy metals, and other persistent pollutants.⁵³

These impacts from dredging ports for cruise ships and associated developments are especially significant for coral reefs and mangroves in island and coastal nations under increasing pressure as cruise ship destinations. Port and resort dredging and development are major issues in places such as Bermuda, the Bahamas, the British Virgin Islands, the Federated States of Micronesia, Hawaii, and Cancun, Mexico, which is under severe pressure from 111 resorts and harbor projects currently under development.⁵⁴

Cruise ships passing through shallow channels often create plumes of sediment from the action of their propellers. The larger the vessels, the more sediment is suspended in the water and later deposited on potentially sensitive habitats. For this reason, it is important to consider restricting the passage and anchoring of large cruise ships in areas of special biological significance, especially shallow ones.

2.10 Endangered Species

Little information is available on the direct impacts of cruise ships on endangered or threatened species. However, some reports give rise to concern. In June 1999, the *Vancouver Sun* reported that a large rare fin whale was discovered jammed on the bow of the Celebrity cruise ship called the *Galaxy*, as it docked in Vancouver Harbor. In July 1999, the Holland America Line's *Westerdam* struck a humpback whale about 60 miles south of Juneau.⁵⁵ In January 2000, a small Bryde's whale was impaled on the bow of another Holland America Line ship, the *Nieuw Amsterdam*.⁵⁶ And in July 2001, government officials reported that an unidentified cruise ship rammed and killed a 37-year-old pregnant humpback whale found dead in Glacier Bay National Park in Alaska.⁵⁷

Other reported deaths of large cetaceans, consistent with injuries sustained by being struck by a ship's hull or propellers, could have been caused by cruise ships. There is also evidence that engine and propeller noises associated with whale-watching cruises may cause disruption of migration, feeding, and breeding behavior of whales, dolphins, and pinnipeds, many of which are threatened or endangered.⁵⁸ Finally, in many locations around the globe, the development of tourist facilities and the associated dredging, filling, and construction activities are damaging or destroying critical habitat for many species of endangered plants and animals.^{59,60}

Industry Initiatives

3.0

Experience has shown that when it comes to protecting the marine environment, enforceable standards are preferable to voluntary standards, no matter how well intentioned.

Over the last eight years, state and federal law enforcement organizations and environmental groups have taken a closer look at cruise industry activities. Passengers have witnessed illegal garbage dumping, and surveillance videotapes have captured harmful quantities of oil-contaminated bilge waste being discharged into navigable waters. The International Council of Cruise Lines (ICCL), the professional association of the 16 major cruise lines that operate within U.S. waters, recognizes that pollution is detrimental to both the environment and business. As a result, ICCL has brought attention to cutting-edge technologies and operational changes that cruise lines are developing to reduce their impact on the environment.

In June 2001, ICCL members adopted *Cruise Industry Waste Management Practices and Procedures*.¹ These environmental guidelines have been incorporated into the 16 ICCL member lines' operating policies, and compliance has been made a condition of ICCL membership.² They closely track new federal requirements adopted for the state of Alaska. However, the guidelines do not subject cruise line companies to criminal liability unless regulations or laws adopting the standards are specifically enacted at the state or federal level. The guidelines generally require gray water and black water to be discharged only while a ship is under way and at least four miles from shore, and require certain photo processing, x-ray, dry cleaning, and other toxic wastes to be recycled or disposed of in accordance with applicable laws and regulations.

In addition, the guidelines require that cruise ships generally:

- Fully comply with laws and regulations;
- Maintain cooperative relationships with the regulatory community;
- Design ships to be environmentally friendly;
- Embrace new technology;
- Improve purchasing strategies and product management to conserve resources;
- Minimize waste and maximize reuse and recycling;
- Optimize energy efficiency through conservation and management;
- Manage water discharges; and
- Educate staff, guests, and the community on positive environmental practices.

Twelve major cruise line companies have also implemented Safety Management System (SMS) plans for developing enhanced waste management systems and increased auditing oversight. These SMS plans are certified in accordance with the International Maritime Organization's International Safety Management Code, although, as noted by EPA, such voluntary management systems are not a wholesale substitute for regulation.³

Industry management systems and guidelines are commendable and in some cases exceed state, national, and international standards. The state of Florida has even signed a memorandum of understanding (MOU) with ICCL and the Florida-Caribbean Cruise Association agreeing to accept industry guidelines as meeting the requirements of state law and deferring "reasonable assurances" that cruise vessels are following industry standards to the Coast Guard. However, experience has shown that when it comes to the protection of the marine environment, enforceable standards are preferable to voluntary standards, no matter how well intentioned.^{4,5,6,7}

Photo by Tom Bol



The International Council of Cruise Lines, the professional association of the 16 major cruise lines that operate within U.S. waters, recognizes that pollution is detrimental to both the environment and business.

ICCL has also described a variety of initiatives to minimize or eliminate pollutants and improve waste management and environmental procedures on board cruise ships. Four member lines are implementing pilot gray water and black water treatment systems that use reverse osmosis, centrifugal, and filtration technologies. Results of field test evaluations on these systems will be shared among the companies.

Cruise line companies have invested in garbage processing technologies for new ships and have upgraded the equipment on older ships to process solid wastes with compactors, comminutors, pulpers, shredders, and incinerators. Compactors reduce the volume of garbage, allowing it to be stored on board until it can be off-loaded at a port with an appropriate facility. Comminutors reduce food scraps to a thinly chopped residue that is rinsed out of the machine by a stream of water. The resulting slurry is discharged to the ocean. Pulpers reduce paper and cardboard into a papier-mache-like slurry, which is also discharged into the ocean. Shredders employ rotating blades to grind bones, metal, glass, and plastics. Properly designed incinerators can burn most types of garbage, including cardboard, paper, and, under certain circumstances, plastics.

Holland America is experimenting with a wide variety of new systems. One of these treats and filters combined black and gray water to the point where it can be recycled as ballast water, used to clean decks, or used as boiler water feed. Holland America is also designing an “ash bricking” system to bag incinerator ash. The company is also testing tributyltin-free hull paint (TBT is a highly toxic, anti-fouling paint), chemical-free potable water treatment systems, and oil-water separator systems that produce discharge with concentrations

within the parameters set by national and international standards. The line is also reviewing better methods to recycle number two plastic, using compactors, densifiers, and plastic chipping machines, and installing a new digital printing machine that uses pigments and mineral oil and requires no solvents. According to Holland America, only three such printers are currently in use in the United States and – at \$400,000 versus the \$30,000 cost of traditional printers – they represent a big investment to minimize waste.

Royal Caribbean International and Celebrity Cruises recently christened the first cruise ship powered by gas turbine engines; the ship also employs a state-of-the-art, two-stage incinerator to remove dioxins from gas emissions. Gas-turbine technology reduces exhaust emissions by up to 90 percent. In addition, both Royal Caribbean International and Celebrity Cruises burn food waste on board rather than landing it at a port, and some vessels employ full-scale reverse osmosis gray water treatment processes, and treat and recycle condensate from air conditioners in on-board laundry facilities.

In addition to employing new technology to decrease the environmental impacts of waste, many cruise lines provide funding for environmental projects such as beach cleanups and poster competitions. On May 22, 2000, Royal Caribbean Cruises Ltd. awarded \$1.22 million in eight grants to marine conservation organizations, including \$450,000 over three years to The Ocean Conservancy to support the International Coastal Cleanup and to expand its Model Communities program for reducing marine pollution in Puerto Rico, the Bahamas, Bermuda, and the u.s. Virgin Islands. Other significant contributions include: a three-year grant for \$450,000 to the World Wildlife Fund to certify sustainable fisheries and to develop an eco-label for seafood products from those fisheries; \$100,000 to the Tongass Coast Aquarium for research; and significant donations and grants to the National Audubon Society and other educational and non-profit organizations.

Rules of the Road:

Who's in Charge?

4.0

-
- 4.01 International
 - 4.02 National
 - 4.03 State and Local
-

Programs to address cruise ships' solid and liquid waste streams on an international scale are still either ineffective or nonexistent.

While it is by no means exhaustive, this chapter summarizes the most significant laws – international, national, and local – that regulate the cruise line industry.

4.01 International

The United Nations International Maritime Organization (IMO) sets international maritime vessel safety and marine pollution standards. Based in London, the IMO comprises representatives from 152 major maritime nations including the United States. The IMO implements the 1973 International Convention for the Prevention of Pollution from Ships, as modified by the Protocol of 1978. This convention is known as MARPOL 73/78. Cruise ships flagged under countries that are signatories to MARPOL are subject to MARPOL's requirements, regardless of where they sail. Regulations covering the various sources of pollution from ships are contained within six Annexes of the Convention:

Annex I: Regulations for the Prevention of Pollution by Oil

Annex II: Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk

Annex III: Regulations for the Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form

Annex IV: Regulations for the Prevention of Pollution by Sewage from Ships

Annex V: Regulations for the Prevention of Pollution by Garbage from Ships

Annex VI: Regulations for the Prevention of Air Pollution from Ships

Member nations are responsible for vessels registered, or “flagged,” under their respective nationalities. This responsibility includes certifying a vessel's compliance with established MARPOL pollution prevention standards. The host country, or port state, boards and examines foreign-flagged vessels to ensure that they are operating within international standards.

MARPOL Annex V designates special areas in which disposing of all garbage – except food waste – is prohibited. (See Table 4 for other MARPOL requirements.) These special areas are the Wider Caribbean Region (including the Gulf of Mexico and the Caribbean Sea), the Mediterranean Sea, the Baltic Sea, the Black Sea, the Red Sea, the Persian Gulf, the North Sea, and the Antarctic. But because adequate on-shore waste facilities do not exist in many of these areas, the special discharge prohibition requirements currently apply only to the Baltic Sea, North Sea, and Antarctic. The United States is party to four other international conventions administered by the IMO that are related to ship safety and to protecting the marine environment: the International Convention for the Safety of Life at Sea (SOLAS); the International Convention on Standards, Certification, and Watchkeeping; the International Labor Organization Convention No. 147, Concerning Minimum Standards on Merchant Ships; and the International Convention on Load Lines. (See Appendix 2 for a list of all signatory nations.)

The IMO also established the International Safety Management (ISM) Code in 1998, which creates an international standard for the management and safety of vessels under SOLAS. The ISM Code's safety management system establishes guidelines and rules related to increased passenger safety and pollution prevention. The ISM code requires cruise ship companies to have a certified environmental compliance and waste management plan. Once a company completes its plan, the IMO issues a document of compliance and a safety management certificate, which is valid for five years and must be endorsed annually. Passenger ships must keep a safety management manual and current safety audit records on board. Both are subject to port state examination.

In order for IMO safety and pollution standards to be binding, they must first be ratified by a total number of member countries whose combined gross tonnage represents at least 50 percent of the world's gross tonnage. This process can often be lengthy and time-consuming. To date, for example, neither Annex IV (which regulates sewage disposal) nor VI (which regulates air pollution) has entered into force because neither has yet been ratified by the requisite number of nations (see Appendix 2). Consequently, programs to address cruise ships' solid and liquid waste streams on an international scale are still either ineffective or nonexistent.

Some nations, such as Bermuda, have adopted their own regulations for the cruise line industry. Yet the most significant problem facing many small countries is a lack of regulation, inspection, and enforcement. For example, at ports of call throughout the Caribbean and developing world, port reception facilities are often nominal or simply unavailable. In 1994, the IMO implemented the Wider Caribbean Initiative for Ship-generated Wastes (WCISW), which encourages Wider Caribbean Basin countries to implement MARPOL 73/78 by developing port reception facilities and adequate facilities for ship-generated wastes. Unfortunately, this program was discontinued in February 1999, before any of the target nations had developed such facilities, because of funding disputes between IMO and the World Bank. Consequently, with the exception of discharging macerated foods beyond three miles, ships are not yet required to adhere to the requirements of the Caribbean's MARPOL "special area" designation.

4.02 National

The U.S. Coast Guard, the Environmental Protection Agency, and the Department of Justice are the primary federal agencies with jurisdiction over cruise ships in U.S. waters. The Coast Guard has primary investigative and regulatory oversight of the cruise ship industry; the EPA develops standards and regulations pertaining to vessel discharges; and the Department of Justice prosecutes violations of federal law. In addition, the Department of State represents the United States at meetings of the International Maritime Organization and international treaty negotiations, and is responsible for pursuing foreign flag violations.

These laws, described in Chapter 11, are summarized in Table 4 (at right). Note that gray water discharges from cruise ships are not regulated under U.S. law.

Table 4: Major Federal Laws and Regulations Applicable to Cruise Ship Wastes

Sewage	
STATUTE	Clean Water Act Section 312 and regulations (33 CFR 159 and 40 CFR 140)
REQUIREMENTS	<ul style="list-style-type: none"> – Cruise ships longer than 65 feet must treat sewage in Type II or III Marine Sanitation Devices (MSDs).* – No discharge of untreated sewage within three miles of shore. – No restrictions on discharging gray water. – States may establish No Discharge Zones (NDZs) with EPA approval.
RESPONSIBLE FEDERAL AGENCIES	<ul style="list-style-type: none"> – Coast Guard inspects and enforces MSD requirements. – EPA issues standards and regulations for MSDs and approves NDZs. – States may enact their own clean water laws within three miles.
Air Pollution	
STATUTE	Clean Air Act and Amendments of 1970 (42 USC 7401 et seq.) State Implementation Plans (40 CFR 51)
REQUIREMENTS	<ul style="list-style-type: none"> – EPA will be issuing new air standards for large (category 3) marine engines by 1/03. – States develop plans to implement, maintain, and enforce national ambient air quality standards and may include cruise ship smokestack emissions within monitoring and enforcement activities.
RESPONSIBLE FEDERAL AGENCIES	EPA Respective states
Solid Wastes	
STATUTE	MARPOL 73/78 Annex V implemented by the Act to Prevent Pollution from Ships, Marine Plastic Pollution Research and Control Act and regulations (33 USC 1901-1912, 33 CFR 151).
REQUIREMENTS	<ul style="list-style-type: none"> – All vessels greater than 26 feet must display placards showing that dumping of all plastics is prohibited. – Dumping floatable dunnage, lining, and packing material is prohibited within 25 miles. – Dumping other unground garbage is prohibited within 12 miles. – Dumping garbage ground in pieces larger than one inch is prohibited within three miles. – Requires vessel waste management plans, and port waste reception facilities
RESPONSIBLE FEDERAL AGENCIES	Coast Guard

*Type II MSDs must not allow effluent to exceed bacteria counts of 200 fecal coliform/100 milliliters and suspended solids of 150 milligrams/liter. Type III MSDs or holding tanks require all sewage to be held on board until it can be properly disposed.

Toxic Wastes	
STATUTE	Resource Conservation and Recovery Act (RCRA) (42 USC 6901 et seq.)
REQUIREMENTS	<ul style="list-style-type: none"> – Regulates the treatment, storage, and disposal of hazardous wastes. – Ambiguity regarding “point of discharge” and whether cruise ships or fleets are large or small generators of toxic wastes such as paint, dry cleaning fluids, photo chemicals, medical wastes, etc.
RESPONSIBLE FEDERAL AGENCIES	EPA
Oil	
STATUTE	Oil Pollution Act of 1990 (OPA 90, 33 USC 2701 et seq.); section 311 of the CWA; and regulations (33 CFR 151)
REQUIREMENTS	<ul style="list-style-type: none"> – No visible sheen or oil content less than 15 ppm within 12 miles. – No more than 100 ppm discharged en route beyond 12 miles. – Oily waste must be retained on board and discharged at an appropriate reception facility. – Oil spill response plans are required. – Oil record books are required for disposal of oily residues and bilge water.
RESPONSIBLE FEDERAL AGENCIES	Coast Guard



Photo by Pro-visions.com

4.03 State and Local

Recently, state governments have begun to consider the economic and environmental impacts of the cruise line industry. In the past, complaints or allegations by citizens to state agencies would have been forwarded to the U.S. Coast Guard or the EPA. Some states, notably Alaska, California, and Hawaii, have adopted or are considering legislation to provide additional oversight over cruise vessels that operate within their jurisdictions.

Ultimately, the decision on whether or not to conduct a state or local investigation rests with the state's attorney general or local prosecutor's office, where resources are often limited. In 2000, the state attorney general's office in Alaska, for example, employed only one criminal environmental attorney and investigator for the entire state.

In California, legislation enacted in September 2000 creates a cruise ship environmental task force to evaluate the practices and waste streams of large cruise ships (A.B. 2746). It requires cruise ships that operate in California to monitor and record the releases of all waste materials and to submit reports to the state legislature, which assesses the impacts of those releases on water quality, human health, and the marine environment. The state air board must also measure and record the opacity of air emissions of vessels while berthed or anchored within the state. Hawaii is considering similar legislation.

In March 2000, Florida's Department of Environmental Protection signed a memorandum of understanding with the member lines of the Florida-Caribbean Cruise Association in which the industry pledged to comply with laws and regulations pertaining to waste streams consistent with ICCL waste management guidelines. Yet the MOU details no enforcement mechanism to ensure compliance.

Alaska's southeastern coast, notable for its fabled Inside Passage and a prime destination for cruise ships, poses special problems for the state. Because small areas within the Passage are outside the three-mile U.S. limit, some ships discharge untreated human waste into these "donut holes." In fact, the donut holes attracted so much traffic that they presented a navigational safety hazard. In July 2001, Alaska Governor Tony Knowles signed into law a bill that established an unprecedented monitoring and testing program for cruise ship discharges. The new law, H.B. 260, for the first time prohibits the discharge of untreated gray water into state waters and sets gray water standards. It also requires all owners and operators of cruise ship vessels to register with the state, maintain and provide records of all discharges, collect routine samples of vessels' treated sewage, gray water, and other wastewater, and imposes a "head tax" or port fee, to help the state pay for compliance. Alaska also passed a bill in 2000 banning the use of TBT, a highly toxic, anti-fouling paint, on large vessels, including cruise ships, that enter its waters.

Alaska's efforts to enact strong state controls on cruise ships also prompted the 106th Congress to enact new federal legislation. The new law, H.R. 5666, prohibits cruise ships from discharging untreated sewage and gray water in the Alexander Archipelago in southern Alaskan waters. It also prohibits the discharge of treated sewage and gray water within one mile of shore and at less than six knots; requires the Coast Guard to inspect cruise vessels for compliance and properly functioning equipment; authorizes the Coast Guard to conduct surprise inspections of vessel logbooks and discharges; authorizes the EPA to establish effluent standards for treated sewage and gray water; and authorizes the state of Alaska to establish no-discharge zones to prohibit all discharges of gray water and sewage from cruise vessels in any waters within the state. This new federal law, combined with Alaska's strong new sampling, testing, and reporting requirements, establishes a framework for the adoption of model federal legislation that should be applicable throughout u.s. waters.

This new federal law, combined with Alaska's strong new sampling, testing, and reporting requirements, establishes a framework for the adoption of model federal legislation that should be applicable throughout U.S. waters.

How Are U.S. Laws Working?

5.0

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- 5.01 Cruise Ship Waste vs. Municipal Waste
 - 5.02 Comparing Cruise Ships to Small Cities
 - 5.03 Coast Guard Inspections Are Hamstrung
 - 5.04 Foreign Flag Violations
-

The Clean Water Act requires all vessels to have a Coast Guard-certified marine sanitation device that meets federal standards. But this law applies only within three miles of the U.S. coast; beyond three miles, ships may discharge raw sewage anywhere.

The responsibility for preventing, investigating, and adjudicating civil maritime environmental violations falls primarily to the Coast Guard. Criminal violations by cruise ships and cruise lines are referred to the U.S. Department of Justice for prosecution. In turn, the Justice Department uses the expertise and resources of the Federal Bureau of Investigation, the Environmental Protection Agency, and the Coast Guard to help investigate and prosecute criminal cases.

5.01 Cruise Ship Waste vs. Municipal Waste

Discharges into the marine environment from cruise ships and discharges from land-based facilities are regulated differently. The Clean Water Act was developed initially to control discharges from municipal sewage treatment plants and industrial facilities through the National Pollutant Discharge and Elimination System (NPDES). Applicants for NPDES permits must submit information on the composition of their wastewater, including metals and other toxic substances, and the flow and frequency of the discharge. The EPA establishes national, technology-based effluent limits that specify the rate, concentration, and amount of pollutant that may be discharged. But sewage discharged from cruise ships and other vessels is exempt from NPDES permit requirements and effluent limits; moreover, gray water is not regulated by the EPA and therefore can be dumped anywhere.

In lieu of an NPDES sewage treatment permit, section 312 of the Clean Water Act requires all vessels to have a Coast Guard-certified marine sanitation device (MSD) that meets federal standards. But this law applies only within three miles of the U.S. coast and, beyond three miles, ships may discharge raw sewage anywhere.

This method of regulating sewage discharges from cruise ships and other vessels does little to prevent the discharge of numerous harmful substances. While the NPDES permit program strictly regulates the concentrations of a wide variety of pollutants, regulations governing vessels address bacterial contamination and total suspended solids only. This means that unlimited quantities and concentrations of other pollutants, such as heavy metals, solvents, detergents, cleaners, pesticides, oil and grease, may be discharged. To limit pollution effectively and equitably, the EPA should establish a permit program for vessels similar to that the one used in Alaska, based upon the NPDES permit system for land-based discharges.

Currently, Coast Guard inspection and oversight of the cruise vessel regulatory program is inadequate. Quarterly inspections do not allow sufficient time to examine sophisticated plumbing and treatment facilities thoroughly. Nor are there programs in place to adequately monitor effluent or receiving water to determine if equipment is functioning properly. By contrast, land-based sewage treatment plants and industrial facilities undergo regular water quality testing, despite the shortage of state and federal inspectors.

5.02 Comparing Cruise Ships to Small Cities

Comparing the discharges of a large cruise vessel and a small city helps to illustrate these discrepancies. The estimated maximum wastewater discharge (sewage, gray water, laundry waste, and oily bilge water) from a cruise ship operating in Alaskan waters is about 346,000 gallons per day. The city of Haines, Alaska, with a population of about 1,325, discharges an average of 307,000 gallons per day. (See Table 5.) Because Haines' wastewater is regulated by an NPDES permit, it must meet discharge criteria for a variety of pollutants that have been found in its waste stream – including metals, ammonia, and coliform bacteria – and it must control the biological oxygen demand and suspended solids in its discharge. The ship, however, need only meet bacterial and suspended solids criteria, and only within three miles of shore.

As part of its NPDES permit requirements, the city of Haines must periodically sample its wastewater and chemically analyze those discharge constituents most likely to affect water quality or the health of marine organisms or the public. Further, it must test the toxicity of its discharge by determining survival time of various marine organisms exposed to samples of its treated waste. It must also submit regular discharge monitoring reports to document its compliance with permit conditions and to report violations and steps taken to end noncompliance. Since the cruise ship can operate without a permit, it was not required to sample, to report on its discharges, or to perform toxicity testing until July 2001, when the state enacted H.B. 260 (see above). Nowhere else in the United States is this required.



Photo by Tom Bol

Table 5: Cruise Ship vs. Municipal Waste Production*

WASTE SOURCE	CONSTITUENTS	PRODUCED PER DAY	EFFLUENT QUALITY REQUIRED
BLACK WATER MILES (NM)	HUMAN WASTE	<16,000g	UNREGULATED >3 NAUTICAL At <3 nm, FECAL COLIFORM COUNT <200/100 ml; TOTAL SUSPENDED SOLIDS <150mg/l
GRAY WATER (CRUISE SHIP)	SHOWERS, SINKS, LAUNDRY, OTHER†	<325,000g	UNREGULATED ANYWHERE. COLIFORM AND TOTAL SUSPENDED SOLIDS ASSUMED < BLACK WATER.
BILGE WATER (CRUISE SHIP)	OILY WASTE	<5,300g	<15 ppm OIL <12 nm <100 ppm OIL >12 nm
TOTAL			346,300g
HAINES, AK	ALL OF THE ABOVE	307,000g‡	NPDES PERMIT STANDARDS + SAMPLING & DMRS§

*Adapted from W.D. Eley, 2000, A Survey of Waste Stream Discharges and Solid Waste Handling Practices of Cruise Ships Operating in Southeast Alaska (Appendix B, Report to The Wastewater and Solid Waste Work Group, Alaska Cruise Ship Initiative). Quantities represent maximums for cruise vessels in the Alaska trade carrying approximately 3,000 passengers and crew.

†Can include fecal coliform, food waste, oil and grease, detergents, cleaners, pesticides, heavy metals, and other hazardous waste but is not treated or regulated.

‡EPA Region 10 data. Approximate population = 1,325

§ Discharge monitoring reports.

This comparison clearly suggests that the current methods for regulating cruise ship waste discharges do not protect public health or the environment. The current regulatory program is an artifact of an era when cargo vessels had crews of 20 and the cruise line industry carried only a fraction of its current 14 million passengers per year. While some cruise line companies are attempting to build cleaner vessels with better on-board treatment facilities, there is no guarantee that that such facilities will be maintained or regularly used or that vessel discharges from such ships will approach the ranges required for land-based discharges. Moreover, as recent wastewater monitoring of Alaskan cruise line vessels indicates, serious inadequacies exist even in these state-of-the-art treatment technologies.¹

5.03 Coast Guard Inspections Are Hamstrung

The u.s. Coast Guard is charged with extensive surveillance, inspection, and compliance monitoring of cruise ships. But it lacks the resources and time to completely fulfill its regulatory responsibilities, and so, by default, it emphasizes safety rather than environmental compliance. As the u.s. Government Accounting Office noted, “The Coast Guard’s ability to detect and resolve violations is constrained by the narrow scope of its routine inspections, a significant reduction in aircraft surveillance for marine pollution purposes, and a breakdown of the process for identifying and resolving alleged violations referred to flag states.”²

Cruise ships are examined upon first entering u.s. waters and then quarterly and annually thereafter. These examinations vary in scope and in the areas scrutinized. For example, inspectors may or may not choose to examine marine sanitation devices.

The Coast Guard Control Verification Examination (cve) is first and foremost a review of the safety and seaworthiness of a cruise vessel. During a cve, Coast Guard inspectors review a vessel's pollution compliance records. MARPOL-required equipment and placards are spot-checked, and all oil discharge-monitoring systems and components are examined. If time permits, the vessel's oily water separator is also tested.

Today's cruise ships, although they are comparable to floating cities, are subject to a mere half-hour per inspection for environmental compliance. Thus, a cve is unlikely to detect operational problems or violations in the complex plumbing systems that isolate and convey black water, gray water, and bilge water or in the on-board oil separators, sewage treatment devices, and incinerators. Nor does the cve or any other requirement actually mandate testing this equipment. Numerous cases of inoperative or inadequately maintained pollution control equipment observed by Department of Justice officials raise serious concerns regarding the cruise lines' voluntary compliance with environmental regulations and practice.^{3,4}

In its recent analysis of foreign-flagged discharges that the Coast Guard investigated between 1993 and 1998, the GAO noted that Coast Guard surveillance and enforcement programs declined significantly over the five-year period. For example, in Florida, the state that hosts the highest concentration of cruise ships in transit or port operations, the Coast Guard cut aircraft surveillance hours in half between 1993 and 1998. (In 1993, the Coast Guard flew 583 hours of aerial surveillance for marine environmental compliance, whereas in 1998 it flew only 283 hours.)⁵ Evidence suggests that some cruise ships were seeking to exploit this shortfall in u.s. Coast Guard resources:

- In 1994, two corporate officers and a ship's master with American Global Line, the former parent company of American Hawaii Cruises, were found guilty and fined \$100,000 for dumping five tons of concrete, metal, paneling, a dishwasher, refrigerators, and other garbage into the sea.⁶
- Passengers aboard the Regal Princess, a Princess Cruises, Inc., ship, videotaped plastic bags of trash being tossed overboard by the crew. The videotape was aired on NBC's "I Witness Video" in 1992 and used by prosecutors to bring charges against Princess Cruises, which pled guilty to a felony violation and paid a \$500,000 fine.⁷
- In 1998, HAL Beheer BV, Holland America Line's parent corporation, pled guilty to felony violations for illegally discharging oily water in Alaska and paid a \$1 million fine. A crewmember, who had refused an order to illegally pump oily bilge water overboard, reported the incident to authorities.⁸
- Between 1994 and 1998, at least eight ships owned and operated by Royal Caribbean Cruises Ltd. were involved in hundreds of separate incidents of illegally discharging oily waste and wastewater contaminated by pollutants through ships' gray water systems. In many cases, Coast Guard cve inspectors were misled by false oil record books and deceptive statements from ships' crews. Some ships' engineers installed temporary pipes to bypass oil-water separators, allowing

unprocessed oily bilge water to be discharged directly to the sea. These pipes were disassembled and stored away during scheduled Coast Guard inspections. The company pled guilty and was fined a total of \$26 million. The company was placed on a five-year probation and further ordered to develop and implement environmental compliance plans and submit quarterly third-party environmental compliance reports to the federal courts and the u.s. Coast Guard.⁹

- Nearly 70 other cruise ships operated by 42 different companies were involved in confirmed illegal discharge cases between 1993 and 1998, a sobering number given the paucity of regulations, inspections, and enforcement programs.¹⁰

In response to a Freedom of Information Act request by The Ocean Conservancy, the u.s. Coast Guard revealed that between 1993 and 1998, cruise ships were charged with 490 safety or environmental violations. During this period, the Coast Guard also issued 73 tickets to cruise ships for oil spills of 100 gallons or less and recommended total penalties of more than \$1.8 million. Ultimately, these penalties were negotiated or pled down to \$528,825. These civil penalty fines of \$528,825 for the entire industry over a five-year period represented only 0.006 percent of one company's (Carnival Corporation) net income for one year. Combined respective Coast Guard and Department of Justice civil and criminal assessments of approximately \$30.5 million over a five-year period represent less than four percent of Carnival Corporation's 1998 net income. Clearly, the deterrent effect of such fines is negligible.

5.04 Foreign Flag Violations

The u.s. Department of State, in conjunction with the u.s. Coast Guard, represents the United States at meetings of the International Maritime Organization. The Department of State also serves as a liaison to flag states, reporting to them on violations discovered by the Coast Guard. The effectiveness of this approach is extremely important, because the vast majority of cruise ships in u.s. waters are foreign flagged, including nearly all ships of the larger companies such as Royal Caribbean, Carnival, Princess, and Holland America.

However, the GAO found that the “relatively poor response rate from other countries on alleged discharge incidents is not in conformance with international agreements,” undermining the IMO's efforts to stem marine pollution. The GAO reported that, before 1992, no action was taken by flag countries in 99 of 111 alleged Annex v violations referred to flag states by the u.s. Department of State.¹¹ This finding led to a change in u.s. policy. In 1992, the u.s. government began its own program of enforcing MARPOL and punishing violations within its waters. Yet even though the Coast Guard referred 17 cruise-ship-related pollution cases to the State Department from 1993 through 1999, there is no information on file with either agency regarding the disposition of these cases. The GAO findings indicate that the State Department and the Coast Guard must make a far stronger effort to follow up on MARPOL referrals to flag countries.¹² MARPOL, after all, cannot be effective without the resolve and determination of the signatory countries.

The EPA itself has acknowledged that federal laws “may not be completely comprehensive . . . and could be more comprehensively exercised.”¹³

It recommends assessing: cruise ship waste streams and their impacts on water quality and the marine environment; effectiveness of existing programs, regulatory and non-regulatory, for managing those waste streams; and options for better management, including both new regulations and voluntary industry programs. Therefore, it is incumbent upon the State Department and Department of Justice to ensure that governments follow up on foreign flag violations by working through the International Maritime Organization and MARPOL and by other diplomatic means.

What the Future Holds:

6.0

Recommendations

The strong growth of the cruise ship industry has outpaced our ability to adopt effective laws to regulate its environmental impacts. The time has come to protect our oceans with measures at least as effective as those we use to protect our rivers, lakes, and streams, and the air of our cities, towns, and rural areas.

“We’ve made the investment needed to venture into the skies, and it has paid off mightily. We’ve neglected the oceans, and it has cost us dearly. This is the time to do for the oceans in the 21st century what our predecessors did for space.”

Sylvia Earle, Scientist and Ocean Explorer

As the cruise line industry continues its rapid growth, its impacts grow accordingly. To deal with increasing volumes of waste, some cruise lines have made significant investments in advanced solid waste and wastewater processing equipment and have developed *Cruise Industry Waste Management Practices and Procedures*, to promote waste minimization, reuse, and recycling throughout the industry.

But cruise ship companies have yet to eliminate illegal discharges. Over the past decade, nearly 70 ships associated with 42 different cruise lines have been cited for illegal discharges of oil, sewage, gray water, plastics, and other solid waste. Fines for violations of more than \$30 million have been levied against these companies.¹

However, effective enforcement is difficult. Criminal prosecutions, led by the U.S. Department of Justice, indicate that cruise line company assets often are located in offshore financial institutions, protected from investigation and liability by strict privacy laws. Furthermore, cruise ships often sail under “flags of convenience,” which provide havens from regulatory oversight and compliance with environmental laws. Small cruise lines often operate in areas with little or no environmental regulation or enforcement capacity.

Controversy continues to surround the industry’s waste management practices for a variety of other reasons:

- Mechanisms to ensure compliance with solid waste, oily bilge, and sewage discharge regulations are inadequate or absent;
- Gray water, which constitutes the largest volume of cruise ship wastewater, is essentially unregulated, although it is known to contain highly toxic pollutants; and
- Violations of oil and plastics discharge laws continue.

The industry has sought to reduce its impacts on the marine environment through voluntary programs. But a more proactive step would be to design and implement a sampling program building on the Alaska example and those used by land-based dischargers. Such a program would clearly measure the effectiveness of voluntary programs and new clean-ship technologies. A sampling program would also verify whether or not discharges from newer vessels are comparable to advanced treatment from land-based sewage treatment plants.

Consequently, The Ocean Conservancy offers the following recommendations.

Reduce and Regulate Cruise Ship Discharges

- Congress should pass national legislation banning the discharge of untreated sewage from cruise ships in all u.s. waters and requiring that treated sewage and gray water be discharged only while a vessel is underway at six knots speed or more and at least 12 miles from shore.
- The EPA should repeal its regulation exempting ballast water discharges from the Clean Water Act. The EPA and the Coast Guard should establish a mandatory ballast water treatment program, and all cruise ship companies should be required to install and use ballast water treatment systems on their vessels.
- Congress and the EPA should clarify that toxic and hazardous cruise ship wastes discharges from dry cleaning operations, photo laboratories, paints, copying machines, and pharmacies are regulated under the Resource Conservation and Recovery Act and may not be discharged into u.s. waters.
- EPA should adopt regulations to implement Executive Order 13158 on Marine Protected Areas, issued by President Clinton in May 2000, to identify ocean areas that warrant additional pollution protection, adopt marine water quality standards, and give states the authority to designate no-discharge zones to reduce the impacts of cruise ships on sensitive ecosystems. Draft rules to establish water quality standards beyond three miles and to create no-discharge zones for special ocean sites were put on hold by the Bush Administration in 2002.²

Improve Monitoring and Inspections

- Congress should increase Coast Guard funding for inspections, certification, and monitoring waste streams.
- The Coast Guard should use aerial surveillance and surprise inspections of pollution control equipment, sewage, gray water (where applicable), and bilge water discharges to ensure that they are in compliance with state and federal standards.
- EPA should work more closely with the Coast Guard in inspecting cruise line compliance with environmental regulations to take advantage of its experience in designing and implementing waste management systems.
- Independent, verifiable, regular, and comprehensive water sampling programs should be established by the EPA in conjunction with the Coast Guard, states, and the cruise line companies to characterize the constituents, toxicity, location, volume, and impacts of cruise vessel discharges.
- Cruise ship companies should be responsible for preparing and submitting reports to the Coast Guard, EPA, and state governments on the performance of treatment systems and all discharges within u.s. waters. This data should be made available to the public through appropriate federal, state, and local agencies so that affected communities have the information necessary to make informed choices.

Strengthen Enforcement Mechanisms

- The State Department and Department of Justice should ensure that governments follow up on foreign flag violations by working through the International Maritime Organization and MARPOL and by other means.
- The Coast Guard and EPA should levy stringent penalties to ensure that cruise line companies comply with record keeping and reporting requirements for all waste streams and garbage logs.
- Fines and penalties associated with the Coast Guard's civil hearing and "Ticket Program" should be evaluated to determine their deterrent effect and be adjusted accordingly.
- Third-party reporting of environmental violations (crew, passengers, and citizens), including the use of on-board observers, should be encouraged through the use of educational materials and citizen suits.

Improve Air Quality Control

- The EPA should work with the U.S. Coast Guard and the states to develop an air-sampling program to monitor and characterize ship emissions, especially in ports located in problem air basins.
- EPA should promulgate final regulations by January 2003 to reduce not only nitrogen emissions from cruise ships and other large vessels under the Clean Air Act, but also other significant emissions such as sulfur, particulate matter, hydrocarbons, carbon monoxide, carbon dioxide, and onboard incinerators.
- Where feasible supplies and infrastructure exist, cruise ships should be required to use the local power grid to reduce air emissions when in port.
- After EPA has proposed regulations to limit the emissions of U.S. vessels, the U.S. should ratify Annex VI to MARPOL to limit emissions from vessels worldwide.
- Cruise ships should take the initiative and use the latest technologies to reduce NOx emissions through Selective Catalytic Reduction Devices, particulate emissions through the use of traps, and SOx emissions through the use of low sulfur fuels.

Develop Education and Training Programs

- Cruise line companies should adopt programs to educate their crews and employees regarding compliance with MARPOL regulations and other laws.
- Cruise line companies should also establish awareness programs to educate passengers before they embark to limit the amount of packaged materials brought on board, such as disposable razors and toiletries.
- The Coast Guard, EPA, and Department of State should request that the IMO update its 1990 study on the adequacy of port waste reception facilities.
- Cruise lines should implement “green” training and education programs for operators and guides.

Improve Research and Development

- New and more effective solid waste and wastewater processing technologies must be developed through advanced research programs funded by industry and the federal government.
 - The cruise line industry should design and implement its own sampling program to demonstrate its clean-ship technology and continue to work with manufacturers on state-of-the-art equipment to reduce solid, liquid, and air emissions.
 - All new cruise ships should be designed with the latest equipment to eliminate the discharge of wastes into the marine environment.
 - Cruise ships should develop and use nontoxic and tributyltin-free hull paint.
-

Let's look to the future. Currently under design is *The Freedom Ship*, a 4,500-foot-long, 750-foot-beam, mobile modern city with 50,000 residents. Suites start at \$121,000 for a 300-square-foot room, and go up to \$11 million for a 5,100-square-foot suite on the 21st floor. The vessel will circumnavigate the globe every two years, making port calls along the way. It will feature a major trade center and an extensive duty-free international shopping mall, as well as residences, banks, hotels, a library, a hospital, light manufacturing, and recreational facilities. The vessel has attracted \$50 million in purchase reservations.³

With its huge size and its potential for affecting ocean ecosystems around the world, *Freedom Ship* is a symbol of the enormous challenge we face. The strong growth of the cruise ship industry has outpaced our ability to adopt effective laws to regulate its environmental impacts. The time has come to protect our oceans with measures at least as effective as those we use to protect our rivers, lakes, and streams, and the air of our cities, towns, and rural areas. Will we continue to treat our oceans as mere travel routes and depositories for trash? Or will we finally realize that our own quality of life ultimately depends upon the health of our oceans?

End Notes

Executive Summary

- 1 *The Contribution of the North American Cruise Industry to the U.S. Economy in 2000*, Prepared for the International Council of Cruise Lines, Business Research and Economic Advisors, October, 2001. www.iccl.org/resources/index.html.
- 2 Cruise Lines International Association, 2001, *Cruise News and Specials*. www.cruising.org/cvpc/news.
- 3 ICCL, 2001.

1.0 Cruising: A Primer

- 1 U.S. Coast Guard, 2000, *USCG Passenger Vessel Control Verification Training Participant Guide*, Washington, DC.
- 2 D. Ward, *Berlitz Complete Guide to Cruising and Cruise Ships 2000* (Princeton, New Jersey: Berlitz Publishing Company, 1999).
- 3 General Accounting Office (GAO) of the United States, 2000, *Marine Pollution: Progress Made to Reduce Marine Pollution by Cruise Ships, but Important Issues Remain* (GAO/RCED-00-48).
- 4 GAO, 2000.
- 5 W. Goldberg, 2000, *Cruise Ship Pollution and International Law: The United States Takes on Royal Caribbean Cruise Lines*, *Wisconsin International Law Journal*, Fall 2000, 19:71.
- 6 *United States vs. Royal Caribbean Cruises Ltd*, 1998, Transcript, United States Attorney's Office, Southern District of Florida, Miami, Florida.

2.0 Unsolicited Contributions: Waste Streams and Other Impacts

- 1 National Research Council (NRC), 1985, *Oil in the Sea: Inputs, Fates and Effects* (Washington, DC: National Academy Press, 1985).
- 2 NRC, 1985.
- 3 R.B. Clark, *Marine Pollution* (Oxford: Clarendon Press, 1986).
- 4 W.D. Eley, 2000, *A Survey of Waste Stream Discharges and Solid Waste Handling Practices of Cruise Ships Operating in Southeast Alaska* (Appendix B, Report to The Wastewater and Solid Waste Work Group, Alaska Cruise Ship Initiative).
- 5 K. Schmidt, 2000, *Cruising for Trouble: Stemming the Tide of Cruise Ship Pollution* (San Francisco: Bluewater Network).
- 6 General Accounting Office (GAO) of the United States, 2000, *Marine Pollution: Progress Made to Reduce Marine Pollution by Cruise Ships, but Important Issues Remain* (GAO/RCED-00-48).
- 7 GAO, 2000.
- 8 Eley, 2000.
- 9 Clark, 1986.
- 10 Eley, 2000.
- 11 Schmidt, 2000.
- 12 Schmidt, 2000.
- 13 Alaska Cruise Ship Initiative (ACSI), 2000b, *Interim Report* (Juneau, Alaska: Department of Environmental Conservation, September 13, 2000). See also ACSI, 2001a and 2001b.
- 14 Clark, 1986.
- 15 GAO, 2000.
- 16 Environmental Protection Agency (EPA), 2001, *Revisions to Clean Water Act Ocean Discharge Criteria Regulations*, Office of Water 4504-F, EPA-842-F-01-001, January 2001.
- 17 EPA, 1999a.
- 18 Eley, 2000.

- 19 ACSI, 2000b.
- 20 General Accounting Office (GAO) of the United States, 2000, *Marine Pollution: Progress Made to Reduce Marine Pollution by Cruise Ships, but Important Issues Remain* (GAO/RCED-00-48).
- 21 Bluewater Network, 2000a.
- 22 Royal Caribbean International, 1998, Environmental Report.
- 23 J. Harte, et. al., *Toxics A – Z* (Berkeley: University of California Press, 1991).
- 24 EPA, 2000b, *Cruise Ship White Paper*, August 22, 2000.
- 25 International Council of Cruise Lines (ICCL), 1999, *Cruise Industry Waste Management Practices and Procedures*.
- 26 Holland America Lines-Westour, 1999, Report on Environmental Programs, www.hollandamerica.com/pr_12g.html.
- 27 RCCL, 1998.
- 28 J.T. Carlton, 2001, *Introduced Species in U.S. Coastal Waters* (Pew Oceans Commission, 2001).
- 29 D. Wilcove, et. al., 1998, Quantifying Threats to Imperiled Species in the United States, *Bioscience*, vol. 8.
- 30 California Regional Water Quality Control Board, San Francisco Region, 2000, *Prevention of Exotic Species Introductions to the San Francisco Bay Estuary: A Total Maximum Daily Load Report to U.S. EPA*.
- 31 California Regional Water Quality Control Board, 2000.
- 32 T. Rawlings, 1999, Ecology and Ballast-Mediated Transfer of *Vibrio Cholerae* 01 and 0139, Presentation at the Conference on Marine Bioinvasions, M.I.T., Cambridge, Massachusetts, January 25, 1999.
- 33 California Regional Water Quality Control Board, 2000.
- 34 Federal Register Notice, 40 CFR 122.3.
- 35 Northwest Environmental Advocates vs. EPA, Jan. 30, 2002, NO. C 01-1297 MJJ.
- 36 Public Resources Code, Section 71200 et seq.
- 37 D.W. Laist, 1996, Impacts of Marine Debris: Entanglement of Marine Life in Marine Debris Including a Comprehensive List of Species with Entanglement and Ingestion Records, *Marine Debris: Sources, Impacts, and Solutions* 99-139.
- 38 Sea Web, Plastics May Pose Threat to Marine Life on Ocean Floor: Report, *Sea Web Ocean Update*, July 1997.
- 39 NRC, 1995, *Clean Ships, Clean Ports, Clean Oceans: Controlling Garbage and Plastic Wastes at Sea* (Washington, DC: National Academy Press, 1995).
- 40 RCCL, 1998.
- 41 GAO, 2000.
- 42 J.J. Corbett and P. Fischbeck, 1997, Emissions from Ships, *Science* 278:823-24.
- 43 EPA, 1999b.
- 44 EPA, 2000a, Press Release: EPA Proposes Reduced Sulfur Content in Diesel Fuel to Ensure Clean Heavy-Duty Trucks and Buses.
- 45 ACSI, 2000a, *Report of the Work Groups: Wastewater and Solid Waste Handling; Air Emissions; Oil Spills; Environmental Leadership* (Juneau, Alaska: Department of Environmental Conservation, May 10, 2000).
- 46 Bluewater Network, 2000b, *A Stacked Deck: Air Pollution from Large Ships* (San Francisco: July 17, 2000).
- 47 Great Barrier Reef Marine Park Authority, World Bank and World Conservation Union (IUCN), 1995, *A Global Representative System of Marine Protected Areas: Vol. 2* (Gland: IUCN).
- 48 Action Atlas, 2000, The Plight of the Planet's Coral Reefs, *Mother Jones*, www.mojones.com/coral_reef/index.html.
- 49 P. Pattullo, 1998.

- 50 S. Schultz, 1998, Passenger Ship May Have Destroyed Coral Reef off Mexico, *Shipping International* 1: 1-2.
- 51 C.S. Rogers, et. al., 1988, Damage to Coral Reefs in Virgin Islands National Park and Biosphere Reserve from Recreational Activities, *Coral Reefs*, 2: 405-410.
- 52 S. Sarkis, 1999, Report on the Potential Impacts of Cruise Ships on Bermuda's Environment, Bermuda National Trust.
- 53 Clark, 1986.
- 54 Action Atlas, 2000.
- 55 Shipping News, 1999, Maritime Matters.com.
- 56 Interview with Kalli De Meyer, February 1, 2000, Biologist, Bonaire Marine Park, Bonaire Netherlands, Antilles.
- 57 u.s. Newswire, 2001. Cruise Ship Kills Endangered Whale in Glacier Bay. www.usnewswire.com/topnews/current_releases/07/24-i23.html.
- 58 CNN, 2001, July 25, 2001.www.cnn.com.
- 59 W.J. Richardson, et. al., 1995, *Marine Mammals and Noise* (San Diego, California: Academic Press, 1995).
- 60 C. Perry, 1998, A Review of the Impact of Anthropogenic Noise on Cetaceans, Submitted to the IWC Scientific Committee. Oman, SC/50/E9.

3.0 Industry Initiatives

- 1 International Council of Cruise Lines (ICCL). 1999. *Cruise Industry Waste Management Practices and Procedures*. Arlington, VA.
- 2 ICCL, August 10, 2001, Report for the World Summit on Sustainable Development 2002, Presented to the United National Environment Programme (UNEP).
- 3 EPA, 2000b.
- 4 L. Nowlan, and I. Kwan, 2001, Cruise Control – Regulating Cruise Ship Pollution on the Pacific Coast of Canada (Vancouver, BC: West Coast Environmental Law, 2001).
- 5 Alaska Cruise Ship Initiative, 2001b, *Interim Cruise Ship Sampling Data Summary* (Juneau, Alaska: Department of Environmental Conservation, September 6, 2001).
- 6 General Accounting Office of the United States, 2000, *Marine Pollution: Progress Made to Reduce Marine Pollution by Cruise Ships, but Important Issues Remain* (GAO/RCED-00-48).
- 7 W. Goldberg, 2000, Cruise Ship Pollution and International Law: The United States Takes on Royal Caribbean Cruise Lines, *Wisconsin International Law Journal*, Fall 2000.

5.0 How Are U.S. Laws Working?

- 1 Alaska Cruise Ship Initiative (ACSI), 2000b, Interim Report (Juneau, Alaska: Department of Environmental Conservation, September 13, 2000). See also ACSI, 2001a and 2001b.
- 2 General Accounting Office (GAO) of the United States, 2000, *Marine Pollution: Progress Made to Reduce Marine Pollution by Cruise Ships, but Important Issues Remain* (GAO/RCED-00-48).
- 3 GAO, 2000.
- 4 ACSI, 2001b.
- 5 GAO, 2000.
- 6 J. Glass, 1994, \$100,000 Dumping Fine for Former AHC Parent, London: Lloyd's List, September 26, 1994.
- 7 Center for Marine Conservation, 1994. *A Citizen's Guide To Plastics In the Ocean: More Than A Litter Problem*, Washington, DC.

- 8 Department of Justice, 1998, News Release: Operator of Holland American Cruise Line Pleads Guilty to Felony Environmental Offenses and Agrees to Pay \$2 Million, www.usdoj.gov/opa/pr/1998/June290.html.html.
- 9 GAO, 2000.
- 10 GAO, 2000.
- 11 GAO, 2000.
- 12 GAO, 2000.
- 13 Environmental Protection Agency, 2000b, *Cruise Ship White Paper*, August 22, 2000.

6.0 What the Future Holds: Recommendations

- 1 General Accounting Office of the United States, 2000, *Marine Pollution: Progress Made to Reduce Marine Pollution by Cruise Ships, but Important Issues Remain* (GAO/RCED-00-48).
- 2 Environmental Protection Agency, 2001, Revisions to Clean Water Act Ocean Discharge Criteria Regulations, Office of Water 4504-F, EPA-842-F-01-001, January 2001.
- 3 www.howstuffworks.com/floating-city.htm.

References

- Action Atlas. 2000. The Plight of the Planet's Coral Reefs. *Mother Jones*, www.mojones.com/coral_reef/index.html.
- Alaska Cruise Ship Initiative (ACSI). 2000a. *Report of the Work Groups: Wastewater and Solid Waste Handling; Air Emissions; Oil Spills; Environmental Leadership*. Juneau, Alaska: Department of Environmental Conservation, May 10, 2000.
- _____. 2000b. *Interim Report*. Juneau, Alaska: Department of Environmental Conservation, September 13, 2000.
- _____. 2001a. Part 2 Final Report: *Cruise Ship Wastewater Monitoring – 2000 Data Review*. Juneau, Alaska: Department of Environmental Conservation.
- _____. 2001b. *Interim Cruise Ship Sampling Date Summary*. Juneau, Alaska: Department of Environmental Conservation, September 6, 2001.
- Albuquerque, K.D., and J.L. McElroy. 1992. Caribbean Small-Island Tourism Styles and Sustainable Strategies. *Environmental Management* 16:619-632.
- Andrade, N. 1999. Reefs and Reforms. *Our Planet* 10:1.
- Anon. 1999. Tourist Boom, Pollution Threaten Caribbean Reefs. www.freesun.be/traveldaily/TOURISM/tourism1297/tourismo31297/tourist.html.
- Bermuda Department of Tourism. 1999. *Understanding Bermuda's Cruise Ship Policy*. Hamilton, Bermuda.
- Bluewater Network. 2000a. Petition to EPA Administrator Carol M. Browner. March 17, 2000.
- _____. 2000b. *A Stacked Deck: Air Pollution from Large Ships*. San Francisco: July 17, 2000.
- California Regional Water Quality Control Board, San Francisco Region. 2000. *Prevention of Exotic Species Introductions to the San Francisco Bay Estuary: A Total Maximum Daily Load Report to U.S. EPA*.
- Campbell, F.A. 1999. Whispers and Waste. *Our Planet* 10:3.
- Carlton, J.T. 2001. *Introduced Species in U.S. Coastal Waters*. Pew Oceans Commission.
- Center for Marine Conservation. *Global Marine Biological Diversity – A Strategy for Building Conservation into Decision Making*. Washington, DC: Island Press, 1993.
- _____. 1994. *A Citizen's Guide To Plastics In the Ocean: More Than A Litter Problem*. Washington, DC.
- _____. 1999. Marine Debris Information and Resources Page. www.cmc-ocean.org/mdio/f&f.php3.

- Clark, R.B. *Marine Pollution*. Oxford: Clarendon Press, 1986.
- CNN. 2001. www.cnn.com, July 25, 2001.
- Corbett, J.J., and P. Fischbeck. 1997. Emissions from Ships. *Science* 278:823-24.
- Cruise Lines International Association. 2001. Cruise News and Special. www.cruising.org/cvpc/news/news.cfm?NID=69.
- Anon.1999. Company Profile: Royal Caribbean Cruise, Exceeding Expectations. *Cruise Industry News Quarterly* 37.
- Daugherty, S., Esq. May 30, 2000. Assistant State Attorney General, Alaska. Interview.
- De Meyer, Kalli. February 1, 2000. Biologist. Bonaire Marine Park, Bonaire Netherlands, Antilles. Interview.
- Department of Justice. 1998. News Release: Operator of Holland American Cruise Line Pleads Guilty to Felony Environmental Offenses and Agrees to Pay \$2 Million. www.usdoj.gov/opa/pr/1998/June290.html.html.
- Eley, W.D. 2000. *A Survey of Waste Stream Discharges and Solid Waste Handling Practices of Cruise Ships Operating in Southeast Alaska*. Appendix B, Report to The Wastewater and Solid Waste Work Group. Alaska Cruise Ship Initiative.
- Eichenberg, T. 1992. *Maine Citizen's Handbook on Coastal Water Quality Enforcement*. Portland, Maine: Marine Law Institute, University of Maine School of Law.
- Environmental Protection Agency (EPA). 1999a. Nature of Discharge Report: Gray Water. *In Phase I Uniform National Discharge Standards for Vessels of the Armed Forces: Technical Development Document*. EPA 821-R-99-001, April 1999.
- _____. 1999b. *Prevention of Air Pollution from Ships*. Submission by United States to Marine Environment Protection Committee, International Maritime Organization, 44th session, Agenda Item 11, December 24, 1999.
- _____. 2000a. Press Release: EPA Proposes Reduced Sulfur Content in Diesel Fuel to Ensure Clean Heavy-Duty Trucks and Buses.
- _____. 2000b. *Cruise Ship White Paper*. August 22, 2000.
- _____. 2001. Revisions to Clean Water Act Ocean Discharge Criteria Regulations. Office of Water 4504-F. EPA-842-F-01-001. January 2001.

- Faris, J, and K. Hart. 1995. *Sea of Debris: A Summary of the 3rd International Conference on Marine Debris*. North Carolina Sea Grant, UNC-SG-95-01.
- Federal Register Notice, 40 CFR 122.3.
- Florida-Caribbean Cruise Association. 1999. Caribbean Cruising, 2nd Quarter. FCCL. Westin, Florida.
- Fox, R. 1999. *Liners – The Golden Age*. London: Konemann Verlagsgesellschaft mbH.
- Freedom Ship. 2000. www.freedomship.com.
- General Accounting Office of the United States. 1995. *Coast Guard: Enforcement Under MARPOL V Convention on Pollution Expanded, Although Problems Remain*. GAO/RCED-95-143.
- _____. 2000. *Marine Pollution: Progress Made to Reduce Marine Pollution by Cruise Ships, but Important Issues Remain*. GAO/RCED-00-48.
- Giuliano, J.A. 2000. Cruise Ship Pollution – A Holiday of Toxins. Environmental News Service. www.ens.lycos.com/ens/feb2000L-02-05g.html.
- Glass, J. 1994. \$100,000 Dumping Fine for Former AHC Parent. London: Lloyd's List, September 26, 1994.
- Global Coral Reef Monitoring Network (GCRMA). 2000. *Reef Base*. Penang, Malaysia: International Center for Global Living Resources Management.
- Goldberg, W. 2000. Cruise Ship Pollution and International Law: The United States Takes on Royal Caribbean Cruise Lines. *Wisconsin International Law Journal*, vol. 19 Fall 2000.
- Great Barrier Reef Marine Park Authority, World Bank and World Conservation Union (IUCN). 1995. *A Global Representative System of Marine Protected Areas: Vol. 2*. Gland: IUCN.
- Harte, J., C. Holdren, R. Schneider, and C. Shirley. *Toxics A – Z*. Berkeley: University of California Press, 1991.
- Hawkins, J.P., and C.M. Roberts. 1994. The Growth of Coastal Tourism in the Red Sea: Present, and Future Effects on Coral Reefs. *Ambio* 23:503-508.
- Holland America Lines-Westour. 1999. Report on Environmental Programs. www.hollandamerica.com/pr_12g.html.
- www.howstuffworks.com/floating-city.htm.
- International Council of Cruise Lines (ICCL). 1999. *Cruise Industry Waste Management Practices and Procedures*. Arlington, VA.
- _____. Report for the World Summit on Sustainable Development 2002, presented to the United National Environment Programme (UNEP), August 10, 2001.

International Maritime Organization (IMO). 1997. MARPOL 73/78 Consolidated Edition, 1997. London: IMO Publication Sales No. IMO-520E.

_____. 1998. Annex VI of MARPOL 73-78, Regulations for the Prevention of Air Pollution from Ships and Nox Technical Code. London: IMO Publication Sales No. IMO-664E.

International Transport Workers' Federation. 1997. Website. www.itf.org.uk.

IUCN/UNEP. 1998. Coral Reefs of the World Vol. I: Atlantic and Eastern Pacific. *UNEP Regional Seas Directories and Bibliography*. Gland, Switzerland: IUCN.

Laist, D.W. 1996. Impacts of Marine Debris: Entanglement of Marine Life in Marine Debris Including a Comprehensive List of Species with Entanglement and Ingestion Records. *Marine Debris: Sources, Impacts, and Solutions* 99-139.

Lean, G. 1999. The Size of the Problem. *Our Planet* 10:3.

Lloyd's List. 2000. *Cruising Into a New Age of Giants*. London: Lloyd's List, April 6, 2000.

Maxtone-Graham, J. 1977. *The Only Way to Cross – The Golden Era of the Great Atlantic Express Liners*. New York: Barnes and Noble Books, 1977.

Anon. 1999. Megatourism, Intensive Fishing, and Sewage, Sewage, Sewage. www.mojones.com/coral_reef/florida.html.

National Research Council. 1985. *Oil in the Sea: Inputs, Fates and Effects*. Washington, DC: National Academy Press.

_____. 1989. *Using Oil Spill Dispersants on the Sea*. Washington, DC: National Academy Press, 1989.

_____. 1995. *Clean Ships, Clean Ports, Clean Oceans: Controlling Garbage and Plastic Wastes at Sea*. Washington, DC: National Academy Press, 1995.

Northwest Environmental Advocates vs. EPA, NO. Jan. 30, 2002. C 01-1297 MJJ.

L. Nowlan, and I. Kwan, 2001. Cruise Control – Regulating Cruise Ship Pollution on the Pacific Coast of Canada. Vancouver, BC: West Coast Environmental Law.

Pattullo, P. 1998. Trouble in Paradise. *UNESCO Courier*, vol. 51, 7/8, p. 49.

Payne, S. 1990. Excerpted from Proceedings of the Marine Safety Council.

Perry, C. 1998. A Review of the Impact of Anthropogenic Noise on Cetaceans. Submitted to the IWC Scientific Committee. Oman, SC/50/E9.

Public Resources Code. Section 71200 et seq.

Rawlings, T. 1999. Ecology and Ballast-Mediated Transfer of *Vibrio Cholerae* 01 and 0139. Presentation at the Conference on Marine Bioinvasions, M.I.T.,

- Cambridge, Massachusetts, January 25, 1999.
- Reges, R. May 26, 2000. Cruise Control, Inc., Juneau, Alaska. Interview.
- Richardson, W.J., C.R. Green, Jr., C.I. Malme, and D.H. Thomson, D.H. 1995. *Marine Mammals and Noise*. San Diego, California: Academic Press.
- Risebrough, R.W. 1977. There Are No Islands Anymore. Documentary film. Berkeley, CA: The Bodega Bay Institute of Pollution Ecology.
- Rogers, C.S., L. McLain, and E. Zulo. 1988. Damage to Coral Reefs in Virgin Islands National Park and Biosphere Reserve from Recreational Activities. *Coral Reefs*, 2: 405-410.
- Royal Caribbean International. 1998. Environmental Report.
- Sarkis, S. 1999. Report on the Potential Impacts of Cruise Ships on Bermuda's Environment. Bermuda National Trust.
- Schmidt, K. 2000. Cruising for Trouble: Stemming the Tide of Cruise Ship Pollution. San Francisco: Bluewater Network.
- Schultz, S. 1998. Passenger Ship May Have Destroyed Coral Reef off Mexico. *Shipping International* 1: 1-2.
- Sea Web. 1997. Plastics May Pose Threat to Marine Life on Ocean Floor: Report. *Sea Web Ocean Update*, July 1997.
- Selva, M.E. March 3, 2000. Careli Tours, Nicaragua. Interview.
- Shipping News. 1999. Maritime Matters.com.
- Sweeting, J., A. Bruner, and A. Rosenfeld. 1999. *The Green Host Effect – An Integrated Approach to Sustainable Tourism and Resort Development*. Washington, DC: Conservation International.
- Thompson, T. May 12, 2000. International Council of Cruise Lines. Interview.
- Torok, S. May 30, 2000. Environmental Protection Agency, Alaska. Interview.
- Ubersax, M.B. 1996. Indecent Proposal: Cruise Ship Pollution in the Caribbean. www2.planeta.com/mader/planeta/o896/o896cruise.html.
- U.S. Coast Guard. 1995. Report of the Cruise Ship Safety Review Task Force. Washington, DC.
- _____. 2000. USCG Passenger Vessel Control Verification Training Participant Guide. Washington, DC.
- U.S. Department of Justice 1998. News Release: Operator of Holland American Cruise Line Pleads Guilty to Felony Environmental Offenses and Agrees to Pay \$2 Million. www.usdoj.gov/opa/pr/1988/June/290.htm.html.

U.S. Department of the Navy. 1996. Report to Congress: U.S. Navy Ship Solid Waste Management Plan for MARPOL Annex V Special Areas. Washington, DC.

U.S. Newswire, 2001. Cruise Ship Kills Endangered Whale in Glacier Bay. www.usnewswire.com/topnews/current_releases/07/24-i23.html.

United States vs. Royal Caribbean Cruises Ltd. 1998. Transcript, United States Attorney's Office, Southern District of Florida, Miami, Florida.

Viders, H. 1995. *Marine Conservation in the 21st Century*. Flagstaff, Arizona: Best Publishing Company, 1995.

Ward, D. 1999. *Berlitz Complete Guide to Cruising and Cruise Ships 2000*. Princeton, New Jersey: Berlitz Publishing Company.

Wheatley, N. June 26, 2000. Royal Caribbean Cruises Ltd. Interview.

Wilcove, D., et. al. 1998. Quantifying Threats to Imperiled Species in the United States. *Bioscience*, vol. 8.

Wilkinson, C., Ed. 1998. *Status of Coral Reefs of the World*. Global Coral Reef Monitoring Network, Australian Institute of Marine Science, Dampier, Western Australia.

Appendix 1: Specifications for *Voyager of the Seas* *

Voyager of the Seas*	
CRUISE LINE	ROYAL CARIBBEAN CRUISE LINES
DELIVERY DATE	NOVEMBER 1999
BUILDER	KVAENER MASA – FINLAND
FLAG	LIBERIA
TONNAGE	142,000 TONS
LENGTH	1,017 FEET
BEAM	157.5
SPEED	22 KNOTS
PASSENGERS	3,840
CREW	1,181
PASSENGER DECKS	14
ELEVATORS	14
CABINS	1,648
DINING AREAS	5
MEETING ROOMS/LOUNGES	3 (CAPACITY > 2,250 SEATS)
BAR/NIGHT CLUBS	7
ENTERTAINMENT AREAS	6
SWIMMING POOLS	3
<p>Facilities include: shopping and strolling mall, rock-climbing wall, ice-skating rink, in-line skating track, basketball court, miniature golf course, jogging track, aerobics/fitness center, complete broadcast facilities and equipment for staging live concerts and other high-tech shows.</p>	
<p>*Currently the largest cruise ship in the world</p>	

Appendix 2: Status of International Conventions

COUNTRY	LEGISLATION																						
	IMO CONVENTION 48	IMO AMENDMENTS 91	IMO AMENDMENTS 93	SOLAS CONVENTION 74	SOLAS PROTOCOL 78	SOLAS PROTOCOL 88	STOCKHOLM AGREEMENT 96	LOAD LINES CONVENTION 66	LOAD LINES PROTOCOL 88	TONNAGE CONVENTION 69	COLREG CONVENTION 72	CSC CONVENTION 72	CSC AMENDMENTS 93	SFV PROTOCOL 93	STCW CONVENTION 78	STCW-F CONVENTION 95	SAR CONVENTION 79	STP AGREEMENT 71	STP PROTOCOL 73	INMARSAT CONVENTION 76	INMARSAT OA 76	INMARSAT AMENDMENTS 94	
AFGHANISTAN																							
ALBANIA	•																						
ALGERIA	•		•	•	•			•		•	•					•		•			•	•	
ANDORRA																							
ANGOLA	•			•	•			•			•					•							
ANTIGUA & BARBUDA	•			•	•	•		•	•	•	•					•							
ARGENTINA	•		•	•	•	•		•	•	•	•	•	•			•		•			•	•	•
ARMENIA																							
AUSTRALIA	•	•	•	•	•	•		•	•	•	•	•	•			•					•	•	•
AUSTRIA	•			•	•			•		•	•	•				•							
AZERBAIJAN	•			•				•		•	•					•							
BAHAMAS	•	•	•	•	•	•		•	•	•	•	•				•					•	•	
BAHRAIN	•		•	•				•		•	•					•					•	•	•
BANGLADESH	•		•	•				•		•	•					•			•	•	•	•	
BARBADOS	•	•	•	•	•			•		•	•	•				•		•					
BELARUS				•				•			•	•									•	•	
BELGIUM	•	•	•	•	•			•		•	•	•				•		•			•	•	•
BELIZE		•		•	•	•		•		•	•					•							
BENIN		•			•	•		•		•	•	•				•							
BHUTAN																							
BOLIVIA	•			•	•			•		•	•	•				•							
BOSNIA & HERZEGOVINA	•																				•	•	
BOTSWANA																							
BRAZIL	•	•	•	•	•			•		•	•	•				•		•			•	•	•
BRUNEI DARUSSALAM	•	•	•	•	•			•		•	•					•					•	•	
BULGARIA	•	•	•	•	•			•		•	•	•				•		•			•	•	
BURKINA FASO																							
BURUNDI																							
CAMBODIA	•			•	•			•		•	•												
CAMEROON	•	•		•				•			•					•		•			•	•	
CANADA	•	•	•	•				•		•	•	•				•		•			•	•	•
CAPE VERDE	•			•				•		•						•							
CEN. AFRICAN REPUBLIC																							
CHAD																							
CHILE	•	•	•	•	•	•		•		•	•	•				•		•			•	•	•
CHINA			•	•	•	•	•	•		•	•	•	•			•		•			•	•	•
COLOMBIA	•			•	•			•		•	•					•					•	•	
COMOROS																							
CONGO	•			•				•		•													

Appendix 2: Status of International Conventions (continued)

COUNTRY	LEGISLATION																							
	IMO CONVENTION 48	IMO AMENDMENTS 91	IMO AMENDMENTS 93	SOLAS CONVENTION 74	SOLAS PROTOCOL 78	SOLAS PROTOCOL 88	STOCKHOLM AGREEMENT 96	LOAD LINES CONVENTION 66	LOAD LINES PROTOCOL 88	TONNAGE CONVENTION 69	COLREG CONVENTION 72	CSC CONVENTION 72	CSC AMENDMENTS 93	SFV PROTOCOL 93	STCW CONVENTION 78	STCW-F CONVENTION 95	SAR CONVENTION 79	STP AGREEMENT 71	STP PROTOCOL 73	INMARSAT CONVENTION 76	INMARSAT OA 76	INMARSAT AMENDMENTS 94		
COSTA RICA	•																				•	•		
COTE D'IVOIRE	•		•	•	•			•		•	•				•		•							
CROATIA	•			•	•	•		•	•	•	•	•			•		•					•	•	
CUBA	•	•	•	•	•			•		•	•	•		•	•		•					•	•	
CYPRUS	•	•	•	•	•	•		•	•	•	•	•			•		•	•	•			•	•	
CZECH REPUBLIC	•			•	•			•		•	•	•			•							•	•	
DEM. PEOPLE'S REP. KOREA	•		•	•	•			•		•	•	•			•									
DEM. REP. OF THE CONGO	•							•			•				•									
DENMARK	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•					•	•	•
DJIBOUTI	•			•				•			•													
DOMINICA	•	•																						
DOMINICAN REPUBLIC	•			•				•			•													
ECUADOR	•	•	•	•				•		•	•				•		•							
EGYPT	•	•	•	•	•	•		•	•	•					•			•	•	•	•	•		
EL SALVADOR	•										•	•												
EQUATORIAL GUINEA	•			•	•	•		•	•	•	•				•									
ERITREA	•			•		•		•	•	•	•				•									
ESTONIA	•	•	•	•	•			•		•	•	•	•		•									
ETHIOPIA	•			•	•			•		•	•				•									
Fiji	•			•				•		•	•				•									
FINLAND	•	•	•	•	•	•	•	•	•	•	•	•			•		•					•	•	•
FRANCE	•	•	•	•	•	•		•	•	•	•	•			•		•	•	•	•	•	•	•	•
GABON	•			•				•		•					•							•	•	•
GAMBIA	•			•				•		•	•				•		•							
GEORGIA	•			•		•		•		•	•	•			•		•							
GERMANY	•		•	•	•	•	•	•	•	•	•	•			•		•					•	•	•
GHANA	•		•	•	•			•		•	•				•							•	•	
GREECE	•	•	•	•	•	•		•	•	•	•	•			•		•	•	•	•	•	•	•	•
GRENADA	•																							
GUATEMALA	•			•				•			•													
GUINEA	•			•				•		•	•	•			•									
GUINEA-BISSAU	•																							
GUYANA	•		•	•	•			•		•	•	•			•									
HAITI		•		•				•		•							•							
HOLY SEE																								
HONDURAS	•		•	•	•			•		•	•	•			•									
HUNGARY	•			•	•			•		•	•	•			•		•					•	•	
ICELAND	•	•	•	•	•			•		•	•	•		•	•		•					•	•	
INDIA	•	•	•	•	•			•		•	•	•			•			•	•	•	•	•	•	•

Appendix 2: Status of International Conventions (continued)

COUNTRY	IMO CONVENTION 48	IMO AMENDMENTS 91	IMO AMENDMENTS 93	SOLAS CONVENTION 74	SOLAS PROTOCOL 78	SOLAS PROTOCOL 88	STOCKHOLM AGREEMENT 96	LOAD LINES CONVENTION 66	LOAD LINES PROTOCOL 88	TONNAGE CONVENTION 69	COLREG CONVENTION 72	CSC CONVENTION 72	CSC AMENDMENTS 93	SFV PROTOCOL 93	STCW CONVENTION 78	STCW-F CONVENTION 95	SAR CONVENTION 79	STP AGREEMENT 71	STP PROTOCOL 73	INMARSAT CONVENTION 76	INMARSAT OA 76	INMARSAT AMENDMENTS 94
INDONESIA	•	•	•	•	•		•	•	•	•	•				•			•	•	•	•	•
IRAN (ISLAMIC REPUBLIC OF)	•		•	•			•	•	•	•					•		•			•	•	
IRAQ	•			•						•										•	•	
IRELAND	•		•	•	•		•	•	•	•					•		•					
ISRAEL	•			•	•		•	•	•	•	•	•			•					•	•	•
ITALY	•	•	•	•	•	•	•	•	•	•	•	•		•	•		•			•	•	
JAMAICA	•		•	•			•	•		•					•		•					
JAPAN	•			•	•	•	•	•	•	•	•	•			•		•			•	•	•
JORDAN	•			•						•												
KAZAKHSTAN	•			•	•		•	•	•	•	•	•			•					•	•	
KENYA	•			•			•	•	•	•	•	•			•		•			•	•	
KIRIBATI															•							
KUWAIT	•		•	•	•		•	•	•	•					•					•	•	•
KYRGYZSTAN																						
LAO PEOPLE'S DEM. REP.																						
LATVIA	•			•	•		•	•	•	•					•		•			•	•	
LEBANON	•		•	•	•		•	•							•					•	•	
LESOTHO																						
LIBERIA	•		•	•	•	•	•	•	•	•	•	•			•					•	•	
LIBYAN ARAB JAMAHIRIYA	•		•	•	•		•								•					•	•	
LIECHTENSTEIN																						
LITHUANIA	•			•	•		•	•	•	•	•	•			•							
LUXEMBOURG	•			•	•	•	•	•	•	•	•	•			•		•					
MADAGASCAR	•		•	•			•								•							
MALAWI	•			•											•							
MALAYSIA	•			•	•		•	•	•	•					•					•	•	
MALDIVES	•			•			•	•	•	•					•							
MALI																						
MALTA	•	•	•	•	•	•	•	•	•	•	•				•					•	•	
MARSHALL ISLANDS	•	•	•	•	•	•	•	•	•	•	•	•	•		•					•	•	
MAURITANIA	•			•	•		•	•	•	•					•							
MAURITIUS	•		•	•			•	•	•	•					•		•			•	•	
MEXICO	•	•	•	•	•	•	•	•	•	•	•	•			•		•			•	•	•
MICRONESIA (FED. ST. OF)													•									
MONACO	•		•	•			•	•	•	•							•			•	•	•
MONGOLIA	•																					
MOROCCO	•	•	•	•			•	•	•	•	•				•		•			•		
MOZAMBIQUE	•			•			•	•	•	•					•		•			•	•	
MYANMAR	•		•	•	•		•	•	•	•					•							
NAMIBIA	•																					

Appendix 2: Status of International Conventions (continued)

COUNTRY	LEGISLATION																						
	IMO CONVENTION 48	IMO AMENDMENTS 91	IMO AMENDMENTS 93	SOLAS CONVENTION 74	SOLAS PROTOCOL 78	SOLAS PROTOCOL 88	STOCKHOLM AGREEMENT 96	LOAD LINES CONVENTION 66	LOAD LINES PROTOCOL 88	TONNAGE CONVENTION 69	COLREG CONVENTION 72	CSC CONVENTION 72	CSC AMENDMENTS 93	SFV PROTOCOL 93	STCW CONVENTION 78	STCW-F CONVENTION 95	SAR CONVENTION 79	STP AGREEMENT 71	STP PROTOCOL 73	INMARSAT CONVENTION 76	INMARSAT OA 76	INMARSAT AMENDMENTS 94	
NAURU																							
NEPAL	•		•																				
NETHERLANDS	•	•	•	•	•	•	•	•	•	•	•	•	•		•		•			•	•	•	
NEW ZEALAND	•			•	•			•	•	•	•	•			•		•			•	•		
NICARAGUA	•							•	•	•	•										•	•	
NIGER																							
NIGERIA	•		•	•	•			•	•	•	•				•					•	•		
NORWAY	•	•		•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•
OMAN	•		•	•	•	•		•	•	•	•				•		•			•	•	•	
PAKISTAN	•			•	•			•	•	•	•	•			•		•			•	•		
PALAU																							
PANAMA	•	•	•	•	•			•	•	•					•					•	•		
PAPUA NEW GUINEA	•			•				•	•	•					•		•						
PARAGUAY	•																						
PERU	•	•	•	•	•			•	•	•	•	•			•		•			•	•	•	
PHILIPPINES	•		•	•				•	•						•			•		•	•		
POLAND	•		•	•	•			•	•	•	•	•			•		•			•	•		
PORTUGAL	•			•	•			•	•	•	•	•			•		•			•	•	•	
QATAR	•		•	•				•	•	•	•									•	•	•	
REPUBLIC OF KOREA	•	•	•	•	•	•		•	•	•	•	•			•		•			•	•	•	
REPUBLIC OF MOLDOVA																							
ROMANIA	•			•				•	•	•	•	•			•		•			•	•		
RUSSIAN FEDERATION	•	•	•	•	•			•	•	•	•	•			•	•	•			•	•		
RWANDA																							
ST. KITTS AND NEVIS																							
ST. LUCIA	•		•																				
ST. VINCENT & GRENADINES	•			•	•			•	•	•					•			•	•				
SAMOA	•			•	•			•	•	•					•								
SAN MARINO																							
SAO TOME & PRINCIPE	•			•	•			•	•	•					•			•	•				
SAUDI ARABIA	•		•	•	•			•	•	•	•	•			•			•	•	•	•	•	•
SENEGAL	•			•	•			•	•	•					•		•			•	•		
SEYCHELLES	•	•	•	•	•	•		•	•	•					•								
SIERRA LEONE	•			•				•							•								
SINGAPORE	•	•	•	•	•	•		•	•	•	•				•		•			•	•	•	
SLOVAKIA	•	•	•	•	•	•		•	•	•	•	•			•					•	•	•	
SLOVENIA	•	•	•	•	•	•		•	•	•	•	•			•					•	•	•	
SOLOMON ISLANDS	•										•				•								
SOMALIA	•							•															

Appendix 2: Status of International Conventions (continued)

COUNTRY	IMO CONVENTION 48	IMO AMENDMENTS 91	IMO AMENDMENTS 93	SOLAS CONVENTION 74	SOLAS PROTOCOL 78	SOLAS PROTOCOL 88	STOCKHOLM AGREEMENT 96	LOAD LINES CONVENTION 66	LOAD LINES PROTOCOL 88	TONNAGE CONVENTION 69	COLREG CONVENTION 72	CSC CONVENTION 72	CSC AMENDMENTS 93	SFV PROTOCOL 93	STCW CONVENTION 78	STCW-F CONVENTION 95	SAR CONVENTION 79	STP AGREEMENT 71	STP PROTOCOL 73	INMARSAT CONVENTION 76	INMARSAT OA 76	INMARSAT AMENDMENTS 94	
SOUTH AFRICA	•		•	•	•			•		•	•	•			•		•			•	•	•	
SPAIN	•	•	•	•	•	•		•	•	•	•	•			•		•				•	•	•
SRI LANKA	•		•	•				•		•	•							•	•		•	•	
SUDAN	•			•				•							•								
SURINAME	•			•				•															
SWAZILAND																							
SWEDEN	•	•	•	•	•	•	•	•	•	•	•	•		•	•		•	•	•	•	•	•	•
SWITZERLAND	•		•	•	•			•		•	•				•						•	•	•
SYRIAN ARAB REPUBLIC	•		•					•		•	•												
TAJIKISTAN																							
THAILAND	•	•	•	•				•		•	•				•						•	•	
FRM. YUG. MACEDONIA	•																						
TOGO	•			•	•			•		•	•				•								
TONGA	•			•				•		•	•				•								
TRINIDAD & TOBAGO	•	•	•	•				•		•	•				•		•						
TUNISIA	•	•	•	•	•	•		•	•	•	•				•		•				•	•	
TURKEY	•			•				•		•	•				•		•				•	•	•
TURKMENISTAN	•																						
TUVALU				•				•		•	•				•								
UGANDA																							
UKRAINE	•			•	•			•		•	•	•			•		•				•	•	•
UNITED ARAB EMIRATES	•		•	•	•			•		•	•				•		•				•	•	•
UNITED KINGDOM	•	•	•	•	•	•	•	•	•	•	•	•			•		•	•	•	•	•	•	•
UN. REP. OF TANZANIA	•		•					•							•						•	•	
UNITED STATES	•	•	•	•	•	•		•	•	•	•	•			•		•				•	•	•
URUGUAY	•	•		•	•			•		•	•				•		•						
UZBEKISTAN																							
VANUATU	•	•	•	•	•	•		•	•	•	•	•	•		•		•						
VENEZUELA	•			•		•		•	•	•	•				•		•						
VIET NAM	•		•	•	•			•		•	•				•						•	•	
YEMEN	•			•				•		•	•	•						•	•				
YUGOSLAVIA	•			•	•			•		•	•	•			•						•	•	
ZAMBIA								•															
ZIMBABWE																							
ASSOCIATE MEMBER																							
HONG KONG, CHINA		•			•	•		•		•	•	•			•			•	•	•	•		

