

GOOD MATE

Recreational Boating & Marina Manual



THE OCEAN CONSERVANCY



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The Ocean Conservancy

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This document is designed to be an educational tool for recreational boaters; marina owners, operators, and staff; and others concerned about marine and aquatic environmental issues. This document does not constitute a legal or complete reference to the vast array of federal, state, and/or local laws that may be applicable to recreational boating or marina operations. We strongly suggest that all concerned individuals contact the appropriate governmental agency to determine legal requirements.

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INTRODUCTION



Our oceans, coastal waters, estuaries, rivers, lakes, and other bodies of water are important to everyone. They provide beaches to enjoy, economic wealth (tourism and fisheries), and habitats for many important aquatic species. Because of this, recreational water users must adopt a strong, proactive attitude toward the health of our waters. To support this effort, The Ocean Conservancy, the United States Coast Guard (USCG), and the Coast Guard Auxiliary have collaborated on an educational public outreach program aimed at reducing and eliminating marine pollution and environmental degradation.

The *Good Mate* program is designed to raise awareness and promote environmentally responsible boating and marina operations through educational seminars and public activities. The most significant environmental impacts associated with recreational boating and marina activities occur with regard to oil and fuel, sewage, vessel maintenance, solid waste and marine debris, stormwater runoff, and vessel operation. Fortunately, these impacts are identifiable and correctable.

Recreational boaters and marina professionals will learn many valuable techniques to prevent marine pollution, such as how to comply with environmental rules and regulations, how to respond to pollution violations, how to recycle used products, and how to use alternative cleaning products. They will learn how to protect environmentally sensitive areas and improve marina services, including sewage pumpout stations, fuel docks, solid waste collection and recycling, and other marina operations.

Participants will receive a certificate of achievement after completing the required training.

The underlying premise of the *Good Mate* program is that we, as individuals, can correct environmental problems through changes in personal waste management strategies. Small personal changes may produce bigger, cumulative changes in water quality while also reducing our dependence on and use of limited natural resources. Environmentally sound practices can restore declining fish and shellfish populations, allow critical habitats to recover, and continue to draw tourists to the nation's beautiful beaches, shorelines, and waterways.

GOAL AND OBJECTIVES

The goal of the *Good Mate* program is to raise understanding and awareness of recreational boaters and marina staff about how they can help protect aquatic environments while enjoying their recreational boating activities.

The long-term objectives of the *Good Mate* program are:

- To help boaters and marinas develop and incorporate environmentally friendly management strategies in six areas: oil and fuel disposal, sewage discharge, vessel maintenance and repair, solid waste disposal, stormwater runoff, and vessel operation.
- To educate and train recreational boaters and marina staff to be informed and educated stewards of the aquatic environment.
- To help boaters and marinas realize economic benefits while promoting environmentally friendly procedures.
- To foster cooperation between groups interested in the use, quality, and enjoyment of local waters.
- Keep boating fun by maintaining a safe, pleasant, and clean environment.

ORGANIZATION

This training manual is designed to give recreational boaters and marina operators valuable information necessary for understanding environmental rules and regulations, techniques related to preventing marine pollution, and how to respond to pollution violations.

It is divided into three sections: I. *The Water Environment*, II. *The Connection Between the Water and Recreational Boating*, III. *Potential Environmental Impacts of Recreational Boating and Marina Operations*.

The information in Section III (oil and fuel, sewage, vessel maintenance and repair, solid waste, stormwater runoff, and vessel operation) is designed to either stand alone or be used in conjunction with the other sections, depending on a boater's or marina's specific requirements. This training manual is also designed for use by marina supervisors when introducing new staff to the *Good Mate* program.

Each section follows a standard sequence. The pollutant is identified and defined, and its potential impacts to the marine environment are discussed. Potential management strategies and alternatives that may be implemented are then discussed. Applicable regulations, resources, references, and additional helpful material follow.

Although this manual contains information on laws and regulations, it is not intended to serve as a source of legal information. Marina owners and operators should contact federal, state, and local agencies for regulatory information concerning marina and boating activities in their jurisdiction.

I. THE WATER ENVIRONMENT

WATER

Of all the resources on our planet Earth, water is the most valuable! Life began in water over 3.5 billion years ago and life as we know it can only survive with the presence of water.

Water is critical to practically every biological process in plants and animals. Our own bodies are nearly two-thirds water—our brains are 95% water, our blood is 82% water, and our lungs are nearly 90% water. And while we can live for about one month without food, we can survive only a few days without water.

Although nearly three-quarters of the Earth's surface is covered by water, nearly all of this water is either permanently frozen or salty, leaving **only 1% of the Earth's water fit for human consumption.**¹

Not only do we rely on water for our daily functions, we rely on it for our livelihoods as well. In the United States alone, commercial and recreational fishing, boating, tourism, and other coastal industries provide more than 28 million jobs nationwide.² The U.S. Marine Transportation System employs more than 13 million individuals, contributes more than \$742 billion to the U.S. domestic product, and supplies goods to every U.S. state.³ For all it gives to us, our waters certainly deserve protection!

Unfortunately, environmental damage and pollution threaten this valuable resource. We have only years, not generations, to undo this damage and bring our waters to the point where they can maintain themselves naturally. We must use and manage our resources and the environment so that they maintain both a strong economy and preserve a healthy environment for years to come.⁴

Fortunately, each of us can make thoughtful choices in our efforts to protect this important resource while still enjoying all it has to offer.

ECOSYSTEMS

Oceans

The vastness of our planet's oceans is difficult to comprehend. The enormity of these waters can only be fully seen from outer space. The oceans cover over 70% of the Earth's surface; contain 97% of all the water on Earth; house 80% of all life on Earth; and contain 95% of the habitat space on the planet. Over 62% of our planet lies beneath 1,000 meters (3,273 feet) of seawater.⁵ And the average global ocean depth is 3,795 meters (12,450 feet). The Atlantic Ocean alone covers over 82 million square kilometers (32 million square miles) with an average depth of 3,600 meters (11,810 feet). It contains productive fisheries on its continental shelves.⁶ The deepest place in the world's oceans, however, is off the coast of Guam in the Pacific Ocean—the Marianas Trench. It is over 11.7 kilometers deep (36,198 feet or nearly 7 miles!)⁷—much deeper than Mount Everest (29,028 feet) is tall. The Pacific Ocean holds more than half the seawater on Earth—nearly as much as the Atlantic and Indian Oceans combined.⁸

The oceans supported the beginnings of life on this planet when the first living microbes and algae developed 3.5 billion years ago. The oceans are home to both the largest animal in the world, the blue whale, and the tiniest microscopic plankton. They are also home to giant kelp, which can grow to 213 feet in length. And each year the seas provide 29 million tons of fish for human consumption.⁹

The oceans touch the lives of virtually every American regardless of whether we live in a coastal community or deep in the American heartland. One out of six jobs in the U.S. is ocean related. In 1998, fishing provided jobs for 170,000 Americans, pumping \$3.1 billion into the U.S. economy. The U.S. ranked third in the world in fish exports and fishery products, and receives 95% of all incoming trade through American seaports. One out of every two Americans lives within 50 miles of the



coast and the beach is the leading tourist destination in the country, generating an annual estimated income of \$16.3 billion¹⁰—85% of all tourist revenues.

Coastal Waters

The coastal waters, those areas of the ocean extending from the shore to approximately five miles out to sea, are where most of us enjoy our recreational activities—sunning, fishing, surfing, and boating. They are also very profitable. There are 25,500 recreational facilities along the U.S. coasts¹¹—almost 44,000 square miles of outdoor public recreation areas.¹⁰ The average American spends 10 recreational days on the coast each year. In 1993 more than 180 million Americans visited ocean and bay beaches—nearly 70% of the U.S. population. Coastal recreation and tourism generates \$8 to \$12 billion annually.¹¹

Sadly, as more and more Americans live, work, and play along the coast, our activities and actions are having more environmental impacts. It is estimated that the U.S. coastal population will reach 165 million people by the year 2015. Along with increasing coastal populations comes increasing coastal pollution, mainly from polluted runoff. In agricultural areas, pesticides, fertilizers, and animal wastes enter waterways and are carried to the coast. In towns and cities, oil, grease, and other toxic chemicals along with litter and debris from our streets and parking lots are carried off into storm drains, which are rarely treated at sewage plants, and then into our waterways. Large amounts of

sediment from construction sites annually enter our waterways, which can reduce vital sunlight required by plankton, smother seagrass, and clog navigable channels. Sewage from aging and overloaded systems also enters our waterways. All of these pollutants eventually reach our coasts. As a result, in 1998 there were more than 7,200 beach closures and advisories issued in the country due to high levels of bacteria or pollution.

Coastal areas are more than just sandy beaches and pounding surf. Some other important coastal environments are discussed below.

Estuaries

Estuaries are special areas of coastal waters, formed wherever fresh water from rivers, creeks, or streams mixes with saltwater from the seas. These partially enclosed bodies of water are called bays, lagoons, harbors, inlets, marshes, sloughs (pronounced “slews”), sounds, or swamps. A few examples of familiar estuaries are Boston Harbor, Chesapeake Bay, Puget Sound, San Francisco Bay, and Tampa Bay. These unique ecosystems, affected by the tides but sheltered by the land, have many important environmental, cultural, and economic functions.¹²

Estuaries support tens of thousands of birds, mammals, fish, and other wildlife. They act as nurseries for many marine organisms, including most commercially valuable fish species. Estuaries support wetlands, which filter water draining off the uplands, reducing the amount of sediments and pollutants that could enter the open ocean and creating cleaner, clearer water. Estuarine wetlands also protect the uplands, acting as flood control, absorbing floodwaters and dissipating storm surges.¹³

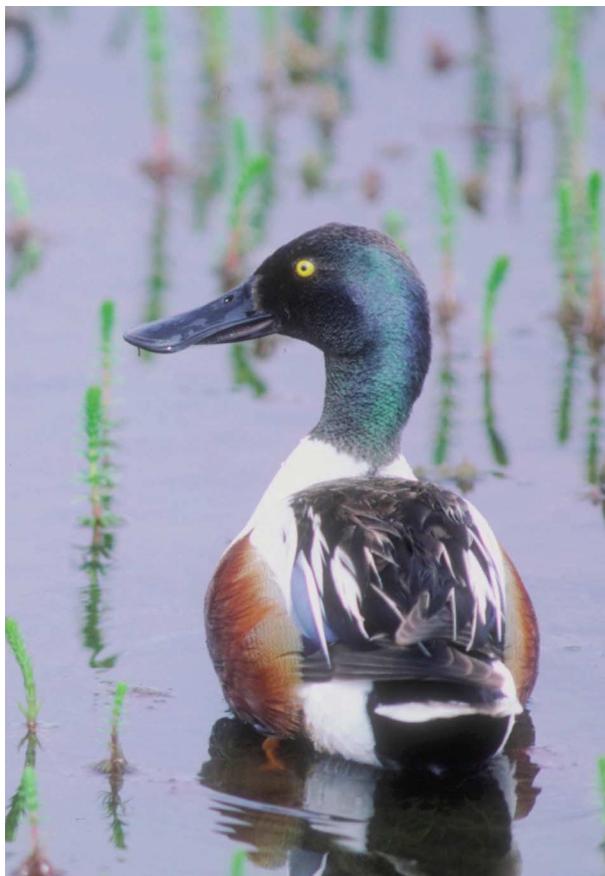
In addition to their ecological importance, estuaries also provide cultural, educational, and aesthetic benefits. They support boating, fishing, swimming, and bird watching. They are a living laboratory, providing lessons in biology, chemistry, geology, physics, and history for students and scientists. And their beauty provides enjoyment for those fortunate enough to live or work near them.¹⁴

Finally, estuaries support the economy in many ways. They provide habitat for more than 75% of America's commercial fish catch, and for 80-90% of the recreational fish catch.¹⁵ Estuarine-dependent fisheries are among the country's most valuable.¹⁶ In just one estuarine system—Massachusetts' Cape Cod Bay—commercial and recreational fishing generate about \$240 million per year. In that same estuary, tourism and beach-going generate \$1.5 billion per year, and shipping and marinas generate \$1.86 billion per year.¹⁷

Seagrass Beds

Another special coastal habitat is the seagrass bed. Seagrasses, such as eel grass, turtle grass, widgeon grass, shoal grass, and manatee grass, are flowering plants that live underwater in salt water and brackish (a mixture of fresh and salty) water environments. Seagrasses are important for many reasons. Like land plants, they produce oxygen for fish and other marine life. Their roots and rhizomes stabilize the bottom, much like land grasses slow soil erosion. The leaves slow water flow, which allows suspended materials such as silt to settle on the bottom. The leaves also trap fine sediments and other particles. Both of these functions help maintain water clarity, which increases the amount of light reaching the seagrass beds.¹⁸

In this clear and calm water, numerous species thrive. Seagrass beds provide habitat for many fish, crustaceans and shellfish. Seagrass beds are nurseries for certain fishes and other marine life. Seagrass leaves are food for animals such as green turtles, sea urchins, and manatees. The algae and small animals that colonize the leaves provide food for other animals such as juvenile fish. As the seagrass decays, the decaying matter becomes food for microbes, shrimp, many fish, and invertebrates.



Mangroves

Mangrove forests are also an important coastal habitat. Mangrove trees thrive in tropical salty environments with high rainfalls. They grow along tidal estuaries, in salt marshes, and on muddy coasts. Interestingly, they have devised ways to survive in salty water, by excreting the salt through their leaves or by blocking the absorption of salt at their roots. Like seagrasses, mangroves trap and cycle organic materials, chemicals, and nutrients for the larger ecosystem.¹⁹

Rivers

Rivers are bodies of fresh water fed by smaller tributaries flowing from upland sources. Seventy percent of the Earth's surface is drained from a system of rivers that carries 34,000 cubic miles of water to the sea each year.²⁰ All of this water is carried downhill through river channels that are surrounded on either side by an area known as the floodplain. A river transports not only water from the uplands, but also sediments and pollutants, and deposits them downriver and onto the adjoining flood plains. The Mississippi River, the largest river in the United States, has carried billions of tons of silt and sediment down stream to form the Mississippi Delta, upon which grew the city of New Orleans.²¹

Rivers are home to a large number of plants, animals, fish, amphibians and reptiles, and the animals that prey upon them. Our rivers are home to more than half the bird species and 80% of the wildlife in the western United States.²²

The food webs or food chains found in river habitats are greatly dependent on the surrounding landscape, and can be severely affected by human activity. The main source of primary food in a river system is found not in the river itself but on land. Detritus—decaying plant material—is carried from the land by runoff flowing into creeks, streams, and rivers where it is consumed by many species of plankton. The plankton are then eaten by newly hatched fish, crustaceans, and aquatic insects, which are themselves food for commercially and recreationally valuable species such as trout, salmon, large mouth bass, small mouth bass, striped bass, catfish, and crayfish. Increased runoff due to development or deforestation, or runoff polluted by toxic chemicals, can harm the entire riverine food web.

Not only is the water quality of our rivers important for the survival of wildlife, rivers also provide a great deal of our drinking water. According to the U.S. Environmental Protection Agency, approximately

11,000 community water systems, serving 160 million people, rely on rivers, lakes, and reservoirs as their main sources of drinking water.²³ Unfortunately, the water found in our rivers is extremely vulnerable to polluted runoff. Pesticides, fertilizers, and animal waste enter our rivers from agricultural areas. A toxic brew of oil, grease, and other chemicals enters rivers from the storm drains of the streets and parking lots of our urban areas, with the result that 40% of our rivers are so polluted that we cannot fish in, swim in, or drink from them.²⁴

Lakes

In the United States, lakes and reservoirs cover 39.9 million acres. These freshwater bodies provide most of our drinking water. In addition, they supply water for industry, irrigation, and hydropower. Lakes support important food webs and are habitats for numerous



threatened and endangered species. Lakes are also the base of the nation's \$19 billion freshwater fishing industry; they support numerous tourism industries and provide countless recreational opportunities.²⁵

The largest of the lake ecosystems is the Great Lakes Basin—the largest freshwater body in the world. This 95,000-square-mile system contains 18% of the world's supply of fresh water, providing drinking water for over 24 million Americans. The Basin supports a wide variety of fish and wildlife species. Fish species include lake trout, lake sturgeon, lake whitefish, walleye, Pacific salmon, and landlocked Atlantic salmon. The Basin provides critical breeding, feeding, and resting habitat as well as migration corridors for waterfowl, colonial nesting birds, and many other species of migratory birds.²⁶

Lake ecosystems vary enormously depending on their size, depth, and geographical location. Lakes have traditionally been considered closed, balanced ecosystems with water and nutrients constantly being recycled. Small lakes can experience enormous daily and seasonal environmental variations while large lakes present a more stable environment for wildlife. As with most aquatic food webs, the primary food source supporting life in lakes is supplied by photosynthetic plankton, algae, and aquatic plants. In addition, aquatic plants such as aquatic grass, provide food and habitat for many commercially important species—much like the seagrasses in the coastal marine environment. Due to a lake's enclosed nature, it is highly vulnerable to the pollution-generating activities of humans.

Major environmental stresses to lakes include excessive nutrient and organic input from fertilizers and sewage; siltation from improper erosion control from construction, agriculture, or mining activities; introduction of exotic species; acidification from mining operations and the effects from acid rain; and contamination from toxic chemicals such as mercury, polychlorinated biphenyls (PCBs), and pesticides.²⁷

Environmental stressors come in many ways. Pollution can come from identifiable industrial or municipal sources or from less-easily identified sources such as urban and agricultural runoff within a lake's watershed. Pollution can even enter a lake system through long-range atmospheric transport of contaminants.

Because most aquatic life exists under the surface, we may not realize the impact that improper boating activities or marina operations may have on our lakes, rivers, coastal waters, and oceans. It is important that we all take steps to protect these fragile aquatic environments. And the first step is to be aware of the connection between our waters and our actions.

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II. THE CONNECTION BETWEEN THE WATER AND RECREATIONAL BOATING

INTRODUCTION

Think of water as the lifeline, or “blood” of an ecosystem. If the blood is contaminated, then the health of the entire organism is compromised. And although our waterways support an incredible diversity of ecosystems and wildlife, they are incredibly vulnerable to our improper waste disposal practices. All the waters of the United States – inland waterways, estuaries, other coastal waters, and the open ocean – are widely used for the disposal of various types of waste including municipal sewage, industrial and commercial waste containing heavy metals and toxic organic chemicals, and dredge spoils.

For the purpose of the *Good Mate* program the term *pollutant* is defined as any substance, manufactured item, or natural organism that is present in the waste stream or marine environment in such a way that may be harmful to the ecosystem or its inhabitants. Pollutants enter the aquatic environment in a variety of ways, but generally pollution inputs can be categorized as **point** or **non-point** discharges.

Point Sources of Pollution

Point sources of pollution are confined discharges, generally within a pipe or other conduit used to move fluids or solid waste from point of origin to point of disposal. Classic examples include industrial and sewage or municipal outfall pipes. All point sources introduce pollution into the environment at a specific site or “point.” Point sources of pollution are generally the easiest to identify, monitor, and regulate. By law, point sources of pollution are required to be registered and regulated by federal, state, and local laws.

Non-point Sources of Pollution

In contrast to point source pollution, non-point source pollution comes from a wide variety of diffuse sources and is unconstrained or unchanneled in movement. According to the U.S. Environmental Protection Agency (EPA), non-point source pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground reservoirs of drinking water.¹ Classic examples of non-point sources include storm drains and runoff from parking lots, roadways, or agricultural land. Non-point sources are more difficult to measure, quantify, and regulate because they tend to be diffuse and widespread. In fact, non-point sources of water pollution are virtually unregulated in the United States, even though they contribute about 60-70% of the pollution in our waters.

The EPA has identified a number of potential boating and marina non-point pollution sources, including improper solid waste and sewage disposal, oil and fuel discharges, improper vessel maintenance, and stormwater runoff. In addition, marinas may impede shoreline stabilization, and inattentive boating operations can damage wildlife and fish habitats.² Boating and marina activities use a wide variety of chemicals and materials that pose a threat to the environment if used or disposed of improperly. Boaters and marina operators must always be diligent in preventing even the smallest amounts of pollutants from entering the water. With more than 10,000 marinas and over 20 million recreational boats in the United States,³ small amounts of boat and marina-generated pollution can quickly add up to major water pollution problems.

LAWS AND AGREEMENTS GOVERNING WATER POLLUTION

Although the seas and other waterways have historically been viewed as convenient dumping grounds of human-made waste, in the last 20 years concern about declining water quality has prompted some changes.

The following is a list of major laws or agreements governing the disposal of wastes into U.S. waters. The particular relevance of some of these laws to recreational boating will be addressed in Section III, but boaters and marina staff should know these laws exist, that they govern boating operations, and where to find more information.

MARPOL

In 1973, the **International Convention for the Prevention of Pollution from Ships at Sea** (MARINE POLLUTION) was drafted and signed by a number of seafaring nations. In 1978, it was updated to include five annexes on ocean dumping. In 1997, an annex on air pollution by ships was added. The annexes cover the following:

- Annex I Oil
- Annex II Hazardous liquid carried in bulk
- Annex III Hazardous substances carried in packaged form
- Annex IV Sewage
- Annex V Garbage
- Annex VI Air Pollution

By ratifying MARPOL 73/78, a country automatically adopts annexes I and II; the remaining annexes are optional. The United States has ratified optional annexes III and V. For a summary of MARPOL, see <http://www.epa.gov/OWOW/OCPD/marpol.html>

MPPRCA

Marine Plastic Pollution Research and Control Act (1987) – MPPRCA implements the International Convention for the Prevention of Pollution from Ships, Annex V (MARPOL 73/78) and restricts the overboard discharge of plastic and other garbage. For a summary, see <http://www.cmc-ocean.org/mdio/marpol.php3>

CWA

Clean Water Act (1972) – focuses on the use, discharge, and disposal of sewage, oil, and hazardous substances including dispersants. For a summary of the CWA and a link to the full text of the Act, go to <http://www.epa.gov/region5/defs/html/cwa.htm>

OPA

Oil Pollution Act (1990) – requires reporting and cleanup of all oil and hazardous substance spills. For a summary of the OPA and a link to the full text of the Act, see <http://www.epa.gov/region5/defs/html/opa.htm>

OAPCA

Organotin Antifouling Paint Control Act (1988) – regulates the use and application of antifouling paints for some marine vessels. For the full text of the Act, see <http://www4.law.cornell.edu/uscode/unframed/33/2404.html>

CVA

Clean Vessel Act (1992) – designed for the construction of pumpout facilities through financial incentives to local marinas. For a summary of the CVA, see http://fa.r9.fws.gov/cva/cva_info.html#CVA. For the details of the Act, see <http://www.fws.gov/laws/digest/reslaws/clenves.html>



FWPCA

Federal Water Pollution Prevention and Control Act (1997) – establishes goals and policies for the restoration and maintenance of the chemical, physical, and biological integrity of our nation’s waters. A summary of the FWPCA can be viewed at: <http://www4.law.cornell.edu/uscode/33/ch26.html>. For FWPCA (section 1322) information on the use of marine sanitation devices: <http://www.uscg.mil/hq/gm/mse/regs/FWCPA.html>

ESA

Endangered Species Act (1973) – provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. For a summary of the ESA and a link to the full text of the Act, see <http://www.epa.gov/region5/defs/html/esa.htm>

MMPA

Marine Mammal Protection Act – establishes a moratorium on taking and importing marine mammals, their parts, and products. The Act provides protection for polar bears, sea otters, walruses, dugongs, manatees, whales, porpoises, seals, and sea lions. For a summary of the MMPA, see <http://www.lab.fws.gov/lab/cargo/mmp.htm>

CZMA

Coastal Zone Management Act – encourages states to preserve, protect, develop, and, where possible, restore or enhance valuable natural coastal resources such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as the fish and wildlife using those habitats. For a summary of the CZMA, see http://tis-nt.eh.doe.gov/oepa/law_sum/CZMA.HTM

CAA

Clean Air Act – regulates air emissions from area, stationary, and mobile sources. This law authorizes the U.S. Environmental Protection Agency to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment. For a summary of the CAA, see <http://www.epa.gov/region5/defs/html/caa.htm>

RCRA

Resources Conservation and Recovery Act – addresses the issue of how to safely manage and dispose of the huge volumes of municipal and industrial waste generated nationwide. For more information on the RCRA, see <http://www.epa.gov/paoswer/hotline/rcra.htm>



PWSA

Port and Waterways Safety Act – states that navigation and vessel safety and protection of the marine environment are matters of major national importance. Insures that the handling of dangerous articles and substances on the structures in, on, or immediately adjacent to the navigable waters of the United States is conducted in accordance with established standards and requirements. For details, see <http://www4.law.cornell.edu/uscode/33/1221.html>

NMSA

National Marine Sanctuaries Act – protects special marine resources, such as coral reefs, sunken historical vessels or unique habitats, while facilitating all “compatible” public and private uses of those resources. For a summary of the NMSA, see <http://www.sanctuaries.nos.noaa.gov/natprogram/nplegislation/nplegislation.html>

References

- ¹ USEPA Office of Water, Oceans and Wetlands <http://www.epa.gov/owow/nps/qa.html>
- ² US Environmental Protection Agency, *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters- Chapter 5: Management Measures for Marinas and Recreational Boating*, EPA Bulletin, Washington, DC 1993.
- ³ USEPA. 2000. Managing Nonpoint Source Pollution from Boating and Marinas. Pointer No. 9. EPA841-F-96-0041

III. POTENTIAL ENVIRONMENTAL IMPACTS OF RECREATIONAL BOATING AND MARINA OPERATIONS



While beneficial to the economy, the nature of a marina's business makes it a potential source of the most damaging types of water pollution: oil and fuel, sewage, chemicals, solid waste and debris, and stormwater runoff. Furthermore, the users of a marina—boaters—can introduce all of these pollutants into the environment through their everyday activities. In addition, boaters can damage the environment directly with their boats. Although there are plenty of potential environmental dangers, there is greater potential for boaters to prevent them.

The following six sections address the potential environmental impacts related to recreational boating and marina operations. The first five sections address pollutants that can be introduced into our waters from everyday marina activities. The sixth section addresses environmental hazards while at sea. All sections discuss the impacts that these pollutants or activities have on the environment, wildlife, and economy. And all sections provide both boaters and marina operators with information on how to reduce, prevent, and eliminate marina and boating-related impacts to the environment.

OIL AND FUEL

What it is and Where it Comes From

Fuel and oil spills can severely damage water quality, wildlife and their habitats, and local economies. These wastes come in many forms as described below.

Petroleum is an oily, flammable liquid that may vary in appearance from colorless to black. Gasoline, diesel fuel, and motor oil are all derived from crude petroleum, depending on the refining process. Petroleum products are so widely used in marinas that the hazards of these materials are easily overlooked.

- **Gasoline** is a highly flammable mixture of volatile hydrocarbons with an octane number of at least 60. It is suitable for use in spark-ignited internal combustion engines. Dangerous fire and explosion risks are a concern whenever handling or using gasoline.
- **Diesel fuel** (fuel oil #2) is moderately volatile. Ignition in diesel engines is based on fuel injection and compression. Diesel fuel presents a moderate fire risk to the handler but is more detrimental to the marine environment because of its slower evaporation rate.
- **Motor oil** is composed of a complex mixture of hydrocarbons distilled from crude oil and is used for lubrication and heat transfer. Most oils exhibit high viscosity and low volatility.

Oil from recreational boats can come from dirty ballast water, oil tank washings, bilge water, slops, sludges, fuel residues, and waste oil. Currently, 50 percent of the oil entering the sea from shipping activities comes from bilge and fuel oil sludges, mainly due to the lack of onshore reception facilities.

Fuel oil enters the water mainly during refueling, but can escape during vessel operation as well. Reports on boat engine pollution have been primarily focused on the effect of two-cycle outboard engines. Two-stroke engines have both intake and exhaust ports open at the same time, which allows raw fuel to escape through the exhaust port. According to an Environmental Protection Agency (EPA) report released in 1991, about one-third of the fuel moving through a two-stroke engine passes directly through the engine – unburned – and into the air and water environments. The EPA is currently reviewing the regulations for outboard engines, and may revise them soon.



Whether discharged from an engine, leaked from a fuel pump, or pumped from a bilge, petroleum hydrocarbons may settle onto the bottom of a body of water and into the sediments, concentrate at the surface, or remain suspended in the water. If left to disperse naturally, some of the hydrocarbons will break up by evaporating into the air.

Impacts

Impacts on the Environment

In an effort to help the situation, many boaters, believing they are taking a role in the solution to pollution, disperse the sheens or spills around their vessels with dishwashing detergents. ***This action actually causes more harm than good and is illegal!*** Using dishwashing soaps adds pollution (soaps) to the water and sends the petroleum below the water's surface where it mixes into the water column and sinks into the sediment where it will remain for years. Using soaps also prevents oil or fuel evaporation, which would occur naturally in an untreated spill.

All petroleum products in the water can be toxic to aquatic organisms. They lower the oxygen levels in the water and generally degrade water quality. Both fuel and oil contain toxic hydrocarbons and heavy metals that can be deadly to aquatic life in very small quantities. Refined products such as motor oil and gasoline are more toxic than crude oils because they are water-soluble. That is, they enter and disperse through the water column quickly (and are thus more difficult to remove once in the water) and are more easily absorbed by an animal's soft tissues.

While almost everyone is familiar with the effects of large disasters such as the *Exxon Valdez* oil spill, many are not as familiar with the effects of smaller, everyday types of spills. Yet every year Americans spill, throw away, or dump out more than 30 times the oil as was spilled in the *Exxon Valdez* disaster in Prince William Sound! When spilled, a single quart of oil can create a two-acre oil slick (the size of three football fields), fouling the water's surface and severely damaging some of the smaller, but most important, aquatic organisms, plankton.

Petroleum in the water also reduces the ability of light to penetrate the water, which is essential for the survival of aquatic plants and photosynthetic plankton, and it reduces the exchange of oxygen at the water's surface that is vital for respiration in aquatic organisms. Petroleum products also contain toxic elements and metals. Gasoline contains more than 100 hydrocarbon compounds as well as lead. Oil contains zinc, sulfur, and phosphorus. Some marinas with fueling docks and poor flushing have been found to have polynuclear aromatic hydrocarbons (PAHs), byproducts of petroleum use, in the sediments.¹

Sustained, low-level concentrations of petroleum in estuaries has been demonstrated to have long-lasting harmful effects on benthic (bottom dwelling) organisms. In addition, it has been found that the larvae of fish and shellfish are extremely sensitive to even very low levels of toxic compounds. Thus, even minor petroleum hydrocarbon pollution from boats may contribute to already toxic concentrations of hydrocarbons in the water column and sediments, and increase the long-term effects on the environment.

Oil may penetrate the benthic zone (bottom sediment area) through the stems and roots of plants, as well as the burrows of worms, mollusks, and crustaceans. These organisms die in their burrows, coated with oil. When these burrows collapse, oil is trapped in the sediments. Ironically, some species thrive in the presence of oil, making it more difficult for the less hardy animals to recover.

Another sensitive underwater zone affected by oil and fuel pollution is the coral reef. Coral reefs, found in warm tropical waters, are home to hundreds of species of marine organisms, including many commercially important fish and shellfish. In the event of an oil spill, the coral cannot move away from the contamination, and although they can move, coral reef fish are often site-dependent, and won't leave their territory even if it's toxic. This makes the pollution of these systems particularly devastating.

Impacts on Species

FISH

Oil damage to fish depends on their life cycle and what stage of development they are in at the time of exposure. Adult fish usually move out of contaminated areas, but fish eggs are vulnerable because they cannot move. Fish that hatch from oiled eggs exhibit many developmental problems such as: malformed jaws, vertebral column deformities, reduced heart rates, and nerve damage. Exposure as adults can cause fin erosion, skin sores, liver damage, and olfactory (nasal) tissue degeneration. Factors directly related to species survival, such as reduced growth rates and reduced reproductive capability, are also results of oil contamination.

BIRDS

Birds have natural oils that make their feathers waterproof, thus regulating their body temperatures by trapping warm air next to the skin. Exposure to petroleum oils strips away the feathers' insulating ability, thus leaving the birds susceptible to hypothermia. Oiled feathers also make flying and swimming impossible. Large amounts of oil are ingested by sea birds during preening, feeding, and drinking saltwater. Seabirds are equipped with a salt gland on top of the skull near the base of the bill. This gland allows them to drink saltwater by extracting the salt from the water and secreting it through the gland. Oil can clog this gland and create a life-threatening situation for the bird. Ingestion of oil causes internal lesions and coats the lining of the digestive tract, preventing food absorption. Hormonal secretion is also disrupted, resulting in fewer eggs laid by females.

The effects of low-level, chronic oil exposure to birds are enormous. Exposure to small amounts of oil weakens the birds so they may live for months or years without problems until there is an environmental stress such as extreme cold weather. Then they die at a faster rate than birds that were not contaminated. Even very low chronic exposure leads to depressed body weight, making the birds susceptible to extreme environmental conditions.

OTHER WILDLIFE

Unlike fish, which can sometimes avoid an oil slick by swimming under it, mammals and sea turtles must surface to breathe. Thus, they are coated and recoated many times before moving out of the contaminated area. This direct physical contact with oil can cause blindness and can clog breathing passages. And while some marine mammals may be able to sense oil spills, there is little evidence that they avoid them. Many remain in their home ranges, even when those areas are contaminated.

Mammals such as sea otters that do not have a layer of blubber for temperature regulation have problems similar to birds. Their fur must be clean and oil-free to trap the warmth next to their skin. Oiled fur also becomes very heavy and non-buoyant, making swimming impossible, and the otters can eventually drown.

Ingestion of oil and fuel-related chemicals during feeding can injure and kill aquatic and marine mammals. Ingestion of petroleum products results in internal lesions in the liver and kidneys, and stomach bleeding. Secondary infections such as pneumonia and brain lesions also result from inhalation of petroleum vapors.

Impacts on the Economy

The impacts on the economy are difficult to tabulate, but it is easy to imagine the effects that oil and fuel polluted waters would have on tourism. Our coastal areas, inland lakes and rivers attract tourists who come to experience the beauty of nature and enjoy aquatic recreational activities. They go to sun, fish, play, boat and swim. Petroleum fumes, tar balls, oily water, dead fish floating on the surface of the water, and dead birds along the shoreline will not satisfy the expectations of most visitors and are not likely to encourage their return. Lower fish populations will not attract recreational fishers. SCUBA divers and snorkelers will not flock to an area to see a dead or severely damaged habitat, or risk their own health by swimming in the water. An area degraded by oil and fuel pollution will have a negative impact on all businesses that rely on boating and recreating visitors—hotels, restaurants, and chartered fishing boats and chartered SCUBA/snorkeling trips.

Spilled oil and fuel not only causes environmental damage leading to a loss of tourism, but to property damage and loss as well. Coastal wetlands, aquatic grasses, shoreline plants, and reefs provide protection to inland areas from strong winds, storm surges, and erosion. If damaged by pollution, these coastal buffers will no longer be able to provide this protection and inland properties will sustain more wind damage, flood damage, and erosion problems.

What Can I Do About It?

Marinas, as well as individual boaters, must play a role in reducing oil and fuel pollution.

Oil pollution at marinas is usually the result of accidents and/or carelessness. Emphasis should be put on developing criteria and procedures for preventing and, when necessary, cleaning up oil spills. Any operation involving the handling of oil or fuel should be accomplished in such a way that the possibility of accidental release is minimized.

One way is to incorporate best management practices (BMPs) into daily marina operations and boating activities. BMPs ensure environmentally responsible behavior. The following are some BMPs that boaters and marinas can implement to reduce oil and fuel pollution.

Best Management Practices for Boaters

The potential for fuel spills is greatest during the fueling of inboard tanks. To prevent accidentally overfilling a tank, the U.S. Coast Guard (USCG) recommends filling inboard fuel tanks to 90 percent capacity. This will allow for fuel expansion due to heat and provide maximum fuel efficiency. Preventing an overflow spill can also be as simple as gently covering the air vent with a rag during fueling to absorb any overflow. Consider purchasing an overflow attachment for the air vent on your fuel tank. These attachments act as fuel/air separators that release air and vapor, but will also contain overflowing fuel.

Bilge pumps often cause the direct discharge of oil and grease into the water. Use oil absorbent pads or booms in the bilges of all boats with inboard engines. These pads can be found at local boating supply stores or in boating catalogs. Check the bilge areas regularly to maintain maximum oil absorbency of the pads, and dispose of saturated pads according to federal, state, and local regulations.

Regularly inspect your boat's through-hull fittings such as the depth finder transponder and cooling water intakes for leakage to reduce the risk of sinking. A sinking vessel not only poses a great safety risk to its passengers but an unmanned vessel sinking at its dock or anchorage can introduce substantial amounts of fuel, oil, and chemicals into the water.

Recycle used oil and filters. If your marina does not have a collection program, encourage it to set one up. For more information on recycling your used oil and filters see *Recycling*, page 19.

Best Management Practices for Marinas

STORAGE AND SPILL PREVENTION

Retail fuel sales constitute a major part of marina business. Routine inspection of storage tanks is a sound business practice and also required by law. Diesel fuel and gasoline are stored on-site in aboveground or underground storage tanks. Aboveground storage tanks are preferred because leaks can be detected earlier than in underground storage tanks. An examination of tank integrity, hose and nozzle condition, and secondary containment equipment – such as a berm surrounding the tank – should be part of the daily inspection. Detecting leaks in underground storage tanks can be as simple as measuring the current tank level and comparing that number to sales receipts.

Using automatic nozzle shut-offs is an effective way to reduce the potential for overfilling fuel tanks. Another is to stock fuel spill guard attachments for your patrons. These inexpensive containers attach to the boat hull's external fuel tank air vent while fueling, to collect any overflowing fuel from entering the water. Inexpensive fuel spill guard devices retail for less than \$25.00. Selling overflow attachments provides an excellent opportunity to discuss spill prevention with marina patrons and boat owners.

Oil and fuel management strategies focus on the proper transfer and containment of petroleum products in the marine environment. The following are specific management practices that should assure the safe transfer and containment of petroleum products:²

- Transfer equipment and hoses should be maintained in good repair and operating condition.
- Delivery nozzles should be hard connected and hung vertically when not in use.
- Pollutants remaining in a hose should not be drained onto the ground or water.
- Safety impact valves should be used on dispensers.
- Marina operators should be present during fueling and must have direct access to emergency shut-off devices.
- Promote the use of automatic/backpressure/shutoff nozzles and fuel/air separators on air vents, vent guards, or tank stems of inboard fuel tanks. Provide waste oil, used oil, and fuel filter receptacles that are clearly marked and subject to regular pickup.
- Have an oil/water separator available at marinas to pump oil or fuel-contaminated bilge water into for treatment when oil absorbent pads become saturated.

- Place containment berms around fixed pieces of machinery that use oil and gas.
- Have absorbent pads readily available at the fuel dock to mop up spills on the dock or in the water. Spill response carts with booms, pads, and absorbents should be on standby during fueling.
- Provide stationary skids for fueling personal watercraft, which will help to eliminate rocking and keep the vessel level in order to minimize spills.
- Provide signage and pamphlets that stress the dangers from spills and fueling activities. Detail those precautions that should be taken by customers and note that *customers may be held responsible for cleanup costs*. Boater workshops could be held to reinforce these concepts.
- Provide impervious fireproof containment trays for use when filling small cans. If possible, product trays should be immediately returned to the fuel tanks.
- Provide secondary containment for piping (double wall piping) and a collection tray under dispensing area.

RECYCLING

Used oil from vessels can be recycled into fresh motor oil by removing the additives and contaminants. Used oil can also be reprocessed to produce a suitable fuel.

Oil recycling has tremendous environmental benefits, including minimizing the disposal of oil to landfills and surface waters, reducing future remediation costs and lowering safety risks associated with storage.³

Marinas can set up an oil recycling program by collecting used oil and bringing it to a designated collection site in your area. Many service stations with repair facilities and oil change shops will accept your used oil for no charge. Marinas can find local and state collection centers in their area by contacting the American Petroleum Institute, API Used Motor Oil Program, 1220 L Street, NW, Washington, D.C. 20005-4070; phone: 202-682-8000, or going to http://www.recycleoil.org/usedoil_collectioncenters.htm.

Marinas can also help by recycling used oil filters. Used oil filters are recyclable because they're made of steel. They are being recycled today into new steel products, such as cans, cars, appliances, and construction materials. Contact the Filter Manufacturers Council, 10 Laboratory Drive, PO Box 13966, Research Triangle Park, North Carolina, 27709-3966; 800-99-FILTER (993-4583) or 919-549-4800. Go to <http://www.filtercouncil.org/regs/index.html> to find your state's recycling regulations, and to find a list of filter management companies serving your state.

Marinas can also post these tips to help boaters correctly collect their used oil for recycling:

- Drain the oil from the boat's engine into a pan that can hold twice the volume of oil in the crankcase. Draining should be done when the oil is warm to ensure that any sludge flows out smoothly. Allow the oil to drain until the oil is flowing at a slow, intermittent drip.
- Replace the drain plug and then move the oil pan to a location where you can safely pour the oil into a container. Wipe up any drips with a paper towel.
- Using a funnel, pour oil into a clean plastic bottle with a lid that screws on tightly – a plastic milk jug is ideal.
- Avoid plastic bottles once used for bleach, cleaners, or other automobile fluids, such as antifreeze – they can contain residues that contaminate the oil. Avoid paint cans and other metal containers, or containers used for gasoline.

SPILL CONTROL

It is important to have appropriate spill control equipment readily available at the marina. Spill control equipment or “spill kits” should be located in areas of potential releases, including fueling and maintenance areas. These kits consist of absorbent material, brooms, shovels, large plastic bags, and rubber gloves. These items can be found at local boating supply stores or in boating catalogs. This equipment should be stored in sealable containers such as drums or pails that can serve as waste containers after a spill. Responding quickly and appropriately to a release will greatly reduce adverse impacts to the business property and surrounding environment.

Proper disposal of used oil and fuel absorbent materials is also important. Absorbent materials saturated with oil may be wrung out into an oil recycling bin, and the absorbent pad or pillow can be reused. For disposal of oil saturated pads or pillows, double bag (one plastic bag inside another) the saturated materials and deposit in the regular trash. Absorbent materials saturated with gasoline may be air-dried and reused, but make sure the drying takes place in an area free from any potential sparks or fires, and any human or animal interaction. ***Before recycling or disposing of any used absorbent materials, contact local authorities for disposal regulations.***

In the event of a spill or release that causes a film, “sheen,” or discoloration of the surface of the water or adjoining shorelines, or causes a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines, call the National Response Center at 800-424-8802 or 202-267-2675. (For more information about the National Response Center, see Appendix A.)

There are a number of tools to be used for response after an oil spill. Among the options available are mechanical cleanup methods (containment booms and skimmers) and non-mechanical methods (dispersants, natural removal, and shoreline cleanup). The selected mix of countermeasures to a severe oil spill will be decided by the U.S. Coast Guard and will depend on potential shoreline and natural resources impact; the size, location and type of oil spilled; weather; and other variables.⁴

Disposal of waste liquids and contaminated spill material can be quite expensive, so the generation of these wastes should be avoided.

A WORD ABOUT DISPERSANTS

Dispersants are specially designed oil spill products that are composed of detergent-like surfactants (chemicals with the ability to break up oil) that have a low toxicity in the environment. Dispersants do not remove oil from the water but break the oil slick into small particles that then disperse into the water. Dispersion of oil into the water column occurs naturally in untreated spills, dispersants speed up the process.

The use of dispersants on oil spills is a highly regulated response tool and should never be used at the discretion of marina operators or recreational boaters.

In the United States, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) sets limitations on dispersant use. Special federal approval and permits are needed for their use, and **dispersants cannot and should not be used without the permission of the U.S. Coast Guard Captain of the Port (COTP).**

When the oil is treated with this method, it initially disperses within the upper 30 feet of the water column. Tides and currents move the dispersed oil horizontally. Usually dispersant use is reserved for deeper waters to ensure sufficient dilution of the oil and to prevent impacts on bottom dwelling organisms. Under certain circumstances they might be used in shallower environments. Dispersant effectiveness is dependent on the type of oil and environmental conditions.⁵

Dispersants have low toxicity but can still be harmful to the environment. Because they disperse the oil they can actually increase the effects of oil on organisms in the upper 30 feet of the water column. Dispersants can also have severe and long term effects on bottom-dwelling organisms.

Another disadvantage of dispersants is that they reduce oil evaporation because less oil is concentrated at the surface; the soluble toxic fractions dissolve more rapidly and reach higher concentrations in seawater than would result from natural dispersal. When oil is dispersed throughout the mixed layer, a greater number and variety of organisms are likely to come in contact with it; the droplets themselves may be ingested by filter-feeding organisms and thus become an integral part of the marine food chain.⁶

Regulations

A number of federal statutes and state regulations govern the handling, dispensing, and storage of fuel, oil, and associated hydrocarbon-derived products. Major regulations are briefly described below. However, marina owners should be aware that they are responsible for the activities that occur at their facility. It is strongly suggested that all staff be made aware of applicable existing federal, state, county, city, and other regulations, statutes, and ordinances. It is recommended that marina operators contact their local governmental entity to determine applicable laws, rules, regulations, and ordinances with respect to proper disposal methods.

Clean Water Act

Commonly referred to as the Clean Water Act (CWA), the Federal Water Pollution Control Act of 1972 prohibits the discharge of pollutants, oil, oily waste, and hazardous substances into U.S. waters. **The CWA also prohibits the use of detergents, soaps, surfactants, or emulsifying agents to disperse oil spills without the express permission of the U.S. Coast Guard.** Violators are subject to maximum civil penalties of up to \$137,500, as well as criminal penalties.



MARPOL 73/78

In 1973, the International Convention for the Prevention of Pollution from Ships at Sea (also known as MARPOL for MARine POLLution) was drafted and signed by a number of seafaring nations. In 1978, it was updated to include five annexes on ocean dumping. In 1997, an annex on air pollution by ships was added. By ratifying MARPOL 73/78, a country automatically adopts annexes I and II; the remaining annexes are optional. The United States has ratified optional annexes III and V.

- Annex I Oil
- Annex II Hazardous liquid carried in bulk
- Annex III Hazardous substances carried in packaged form
- Annex IV Sewage
- Annex V Garbage
- Annex VI Air Pollution

Annex I details the discharge criteria and requirements for the prevention of pollution by oil and oily substances. It contains technical guidelines, and the concept of "Special Areas" that are considered to be vulnerable to pollution by oil. Discharges of oil in Special Areas is completely prohibited, with minor well-defined exceptions.

The Act to Prevent Pollution from Ships, the Ocean Dumping Act, and the Refuse Act

The Act to Prevent Pollution from Ships (33 USC 1901-1915) implements MARPOL in the United States. It prohibits the discharge of oil, hazardous liquid substances carried in bulk, hazardous substances carried in packaged form, and garbage from vessels in the waters subject to the jurisdiction of the United States. Other U.S. laws are also relevant to discharges, so it is not possible to refer only to one of these for a comprehensive treatment of the subject. Besides the Clean Water Act, discussed in this manual, the others include the Ocean Dumping Act (33 USC 1401, et seq.) and the Refuse Act (33 USC 407). All of these laws apply to different aspects of the discharge or deposit of substances or material deemed harmful to the marine environment into waters subject to the jurisdiction of the United States.

Resource Conservation and Recovery Act

Congress passed the Resource Conservation and Recovery Act (RCRA) of 1976 in response to the growing concern that "human health and the environment were being unnecessarily threatened by poor hazardous waste management practices."

Under this law, state and local communities created a number of programs to adequately dispose of hazardous material. Gasoline and other fuels are ignitable and therefore classified as hazardous materials. Used motor oil is generally not regulated as hazardous waste, but does require special handling. Check with your local solid waste or environmental agency for how to handle fuels, and for a list of used oil dropoff sites.

Oil Pollution Act

Congress passed the Oil Pollution Act of 1990 in direct response to the *Exxon Valdez* oil spill. Although intended for large commercial vessels, the law does affect recreational boaters. Specifically, the law states that in the event of a spill, the owner or operator of a vessel can be held financially accountable for cleanup cost and associated damage to the environment. In addition, civil penalties of several thousand dollars can be imposed against an individual for failing to report a spill.

Resources and Contacts

To Report an Oil Spill or Hazardous Substance Release

Call the National Response Center at 800-424-8802. See Appendix A for details from their web site

For More Information on the National Response Team

Go to www.nrt.org, click link for NRT and choose your Region.

Oil, Fuel and Hazardous Waste Disposal Information

Call your local Department of Environmental Management if you have questions about disposal of used oil, household chemicals, or other hazardous waste.

To Report Pollution

In the United States, if you observe any boat not complying with water pollution regulations report it to the USCG Marine Safety Office (MSO). Call the toll-free Coast Guard hotline at 800-368-5647 to locate the MSO near you.

Visit the following websites for more information on oil pollution and spill prevention:

EPA Oil Spill Program

www.epa.gov/oilspill

The Ocean Conservancy Website

www.oceanconservancy.org



U.S. Coast Guard Website

www.uscg.mil

U.S. Coast Guard Auxiliary

For information on the Vessel Safety Check (VSC) program, boater education, and other boating safety related issues: www.cgaux.org

U.S. Power Squadron

For information on boater safety and education programs: www.usps.org

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SEWAGE

What it is and Where it Comes From

Sewage is defined as human body wastes and the wastes from toilets or receptacles intended to receive or retain body wastes. It is also known as *black water*. In contrast, *gray water* is galley, bath, and shower water. Untreated sewage in a body of water can come from various sources including faulty residential, municipal, or marina septic treatment systems, or direct discharges from shoreside facilities and boats.

Vessel sewage is a problem when it is discharged into the water without proper treatment. Discharge can include, but is not limited to spillage, leakage, or dumping. This form of pollution degrades water quality by introducing microbial pathogens into the environment and by increasing biological oxygen demand (BOD), an important water quality measure that refers to the amount of oxygen available in the water for organisms to use. The higher the BOD, the less oxygen there is in the water for animals to survive. The BOD increases particularly in areas with many boats and little water movement.

Just like lawn fertilizers and manure, human waste contains nutrients that can stimulate algae growth and deplete the amount of oxygen in the water. Although it is also a repulsive visual pollutant, our primary concern about sewage in the water is its potential to introduce disease-causing pathogens to swimmers and shellfish.

A single overboard discharge of human waste can be detected in an area up to one square mile of shallow enclosed water.¹ Releasing untreated sewage from a 20-gallon holding tank has the same impact as discharging several thousand gallons of treated sewage from an efficiently operated treatment plant.² Although these single discharges have an impact on the environment, the cumulative effect of numerous single vessel discharges is even more harmful.

Impacts

Impacts on Human Health

Sewage contamination can pose a human health hazard through direct exposure (swimming and other water-contact activities in contaminated waters) or through the consumption of shellfish from contaminated waters. Pathogenic contaminants –



such as streptococci, fecal coliform, and other bacteria – may cause infectious hepatitis, diarrhea, bacillary dysentery, skin rashes, and even typhoid and cholera. The most common organism is a coliform bacterium, which is found in the intestines of all warm-blooded animals, and the most commonly reported ailment is acute gastroenteritis.³ Children, elderly people, and those with weakened immune systems may have a more severe reaction to sewage-contaminated water.

When fecal coliform levels exceed designated public health thresholds, swimming beaches and shellfish beds may be closed. A fecal coliform bacterial count of 14 per 100 milliliters of water requires the closing of shellfish beds. A count of 200 fecal coliform bacteria per 100 milliliters of water closes beaches to swimming and other primary recreation.

Although a few studies directly link the discharge of boat sewage to disease incidence, many studies conducted in Puget Sound, Long Island Sound, Narragansett Bay, Chesapeake Bay, and the Florida Keys do confirm that boats are a significant source of fecal coliform bacteria in coastal waters, particularly in areas with large numbers of boats and little tidal and wave action, such as bays, harbors, and lakes.

Impacts on the Environment

Sewage, as well as gray water, has a higher concentration of nutrients than is naturally found in the aquatic environment. Small amounts are necessary for the healthy development of a natural ecosystem, but when excessive nutrients are introduced into an ecosystem, they can disrupt the natural balance.

Algae are single-celled organisms that are the beginning of most food chains or food webs in the aquatic environment. They use light for photosynthesis to produce their food.

Excessive nutrients act as a “fertilizer” and stimulate algal growth, creating what is called an *algal bloom*. Once the overabundant algae begin to naturally decay, dissolved oxygen in the water is depleted and the amount of bacteria increases. This process, called eutrophication, increases the biological oxygen demand of an ecosystem and leads to foul odors and resultant harm to aquatic life, such as fish kills.

Sewage holding tanks on boats may contain other harmful compounds, including disinfectants and deodorants used in the tank, or other chemicals that the boat owner has poured into the toilet for disposal. These may also have toxic effects on the marine environment. Holding tanks may contain high concentrations of hydrogen sulfide, which is toxic. Concentrations of some of these toxic chemicals in bottom sediment can contaminate and concentrate in bottom-dwelling organisms, and, over time, work their way up through the food chain (a process known as bioaccumulation), ultimately leading to human exposure when the fish or shellfish are eaten.

Impacts on the Economy

Sewage-contaminated water looks bad and can smell worse. The aesthetics of contaminated waterways are diminished by murky water, surface films and scum, odors, and sewage-related floatable debris. Because most marinas have limited flushing capacity, sewage can linger in marina waters and make boating, and even being near the water, very unpleasant.

Sewage contamination of waters can hurt a community’s economy through decreased tourism and waterfront development. Medical care and cleanup costs also become a factor when human health and safety are compromised. In addition, revenue is lost when commercial and recreational fishing activities are suspended following shellfish bed and fishing area closures. In 1995, nearly 375,000 acres of shellfishing beds were closed in Florida due to sewage-contaminated water.⁴ From 1993 to 1996, the number of fish consumption advisories issued across the U.S. rose more than 70 percent.⁵

What Can I Do About It?

Marinas, as well as individual boaters, must play a role in reducing sewage pollution. One way is to incorporate best management practices (BMPs) into daily marina operations and boating activities. BMPs are management measures that ensure environmentally responsible behavior. The following are some BMPs that boaters and marinas can implement to reduce sewage pollution.

Best Management Practices for Boaters

MARINE SANITATION DEVICES

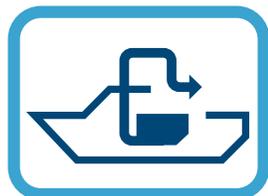
Discharge of raw sewage from a vessel within three nautical miles of the U.S. coastline and the Great Lakes is illegal.

Table 1. Types of MSDs and Their Treatment Systems

Type I	Type II	Type III
<ul style="list-style-type: none"> ■ Treats sewage before discharge by chopping or macerating. May add disinfectant chemicals. Disintegrates solids before discharging into water. ■ Discharge must meet certain health standards for bacteria content; must not show any visible floating solids. ■ Only allowed on vessels smaller than 65’. ■ Being phased out of use on larger vessels. Only allowed if equipment was on vessel before 1/78. 	<ul style="list-style-type: none"> ■ Provides higher level of treatment than Type I. Treats sewage by biological means before discharging. Separates solids for incineration or pumpout. ■ Effluent is cleaner than Type I, but contains greater level of chemicals. ■ Usually requires more space and power than Type I. ■ Usually installed on larger vessels only. 	<ul style="list-style-type: none"> ■ Does not allow the discharge of sewage. Includes recirculating, incinerating MSDs and holding tanks. ■ Holding tanks are the most common kind of Type III MSD used on recreational boats. Waste is stored until it can be pumped out to a reception facility. ■ Holding tank waste is not treated even if odor-reducing chemicals are added. ■ Allows for “Y-valve” to discharge directly overboard while outside the 3nm limit.

In the United States, recreational boats are not required to be equipped with a toilet. However, installed toilets that are not equipped with a marine sanitation device (MSD) and those that discharge raw sewage directly over the side are illegal. Any owner of a vessel with an onboard toilet is required to install and use a U.S. Coast Guard certified marine sanitation device (MSD), preferably a Type III holding tank. (See Table 1 for the types of MSDs and their treatment systems).

While navigating within three nautical miles of the U.S. coastline, any direct flow-through sewage system must be closed, or, if the system is equipped with a Y-valve, the valve should be closed or set to the inboard position. In addition, while cruising in a “no-discharge” zone, Y-valves on marine sanitation devices must be locked in the closed or inboard position.



KEEP OUR WATER CLEAN— USE PUMPOUTS

It should be noted that the regulations regarding installation and use of Type III MSDs have caused great frustration among the boating community. For years, boaters have felt that there are few, if any, convenient places to pump out their boats and that marine sanitation devices are unreliable. However, recent increases in government funding for states to install or improve sewage facilities are increasing the availability of pumpout facilities in some states.

It is important that boaters know they can play a large role in the solution to sewage pollution. They can help by:

- Installing and properly using an MSD III holding tank to keep raw sewage and chemicals out of the water.
- Learning how an MSD works, making sure it functions properly, and making repairs when necessary.
- Using onshore restroom facilities when at the dock. If they are not adequate, boaters should encourage the dock operator to provide appropriate facilities.
- Bringing portable toilets ashore for proper waste disposal.
- Using pumpout facilities when available and asking for them if they are not.
- Encouraging the development of more pumpout stations as well as portable toilet dump stations and learning how to use them.

For direct discharge of sewage, some boats are equipped with a Y-valve, which can only be used beyond three nautical miles of the U.S. coastline. In the United States, Coast Guard regulations require the

Y-valve be secured in the closed or inboard position (by a padlock, non-releasable tie, or other physical barrier) when the boat is within a designated no-discharge zone. Noncompliance may result in a fine.

“No-discharge” zones are areas where the release of raw or treated sewage is prohibited. Designated no-discharge zones are environmentally sensitive areas that require greater protection, where even the discharge of treated sewage could be harmful. **When operating in a no-discharge zone, a Type I or Type II MSD must be secured in some way to prevent discharge.** States, upon meeting certain conditions, can designate environmentally sensitive waters within state waters (generally within three nautical miles) as “no-discharge” zones. All completely enclosed lakes are considered no-discharge zones.

Boaters can find out if there are any no-discharge zones in their area by referring to Appendix B of this manual, contacting their local U.S. Coast Guard Marine Safety Office, or by visiting one of the following websites:

- <http://www.uscg.mil/hq/g-m/mse/nodiszones.htm>
- <http://www.boatus.com/gov/discharge.htm>
- http://www.epa.gov/owow/oceans/vessel_sewage/vsdnozone.html

Please note: The lists of no-discharge zones are subject to change and should be rechecked periodically.

Best Management Practices for Marinas

- Provide pumpout services (such as portable or stationary units, or pumpout boats) or provide information on mobile services and nearby facilities. Clearly label equipment and provide clear instructions for its operation. Instructions should warn against the disposal of any material other than sewage because it can impair the ability of the system to treat wastes.
- Provide dump stations for proper disposal of portable toilet waste. It is illegal to dump the contents of portable toilets overboard within three nautical miles of the U.S. coast.
- To maintain proper functioning of equipment, inspect and maintain sewage disposal facilities regularly. Monitor equipment for proper use.
- Incorporate language into slip leasing agreements encouraging the use of pumpout facilities.
- Provide onshore restrooms and encourage their use. Be sure they are adequate for the size of your marina. Maintain and clean them on a regular schedule.
- In the United States, if you observe any boat not complying with water pollution regulations report it to the nearest U.S. Coast Guard Marine Safety Office. See *Resources and Contacts*.

Regulations

There are several federal and state regulations designed to eliminate improper disposal of sewage into U.S. waters. The Coast Guard is the agency primarily in charge of enforcing of these regulations.

Clean Water Act

In 1972 Congress passed the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act (CWA). Its mission was to “restore and maintain the chemical, physical, and biological integrity of the nation’s waters”.⁶ The CWA set up a permit system to limit industrial and municipal discharges and to protect wetlands. Also, states were required to adopt water quality standards with federal government oversight.

Section 312 of the CWA (33 USC 1322) required the U.S. Environmental Protection Agency (EPA) to set standards for MSDs, and charged the Coast Guard with enforcing those standards.



Clean Vessel Act

Passed in 1992, the Clean Vessel Act (CVA) provided \$40 million for states to construct and maintain pumpout and dump station facilities and for educational outreach and public awareness programs. The Act was reauthorized in 1998, extending the grant program through 2003 and providing an additional \$50 million for states to create alternatives to overboard disposal of recreational boater sewage.

Federal Water Pollution Prevention and Control Act

The Federal Water Pollution Prevention and Control Act (FWPCA) was passed by Congress in 1997 as a declaration of policy against the discharge of hazardous substances into our nation’s waters. It addresses hazardous substances such as sewage, and defines and establishes federal standards for marine sanitation devices (MSDs). The FWPCA establishes guidelines for the certification of MSDs and designates the enforcement of proper MSD use to the U.S. Coast Guard.

MARPOL 73/78

In 1973, the International Convention for the Prevention of Pollution from Ships at Sea (also known as MARPOL for MARine POLLution) was drafted and signed by a number of seafaring nations. In 1978, it was updated to include five annexes on ocean dumping. In 1997, an annex on air pollution by ships was added. By ratifying MARPOL 73/78, a country automatically adopts annexes I and II; the remaining annexes are optional. The United States has ratified optional annexes III and V.

- Annex I Oil
- Annex II Hazardous liquid carried in bulk
- Annex III Hazardous substances carried in packaged form
- Annex IV Sewage
- Annex V Garbage
- Annex VI Air Pollution

Annex IV contains requirements to control pollution of the sea by sewage. According to the International Maritime Organization (IMO), 73 nations have accepted Annex IV as of February 1999. This represents 42.59 percent of the world’s merchant fleet in gross tonnage. Annex IV will be “entered into force,” or become binding upon governments that have ratified it, 12 months after being ratified by at least 50 percent of the world fleet. The United States has not ratified Annex IV because existing federal and state regulations to prevent sewage discharge are more stringent than the guidelines put forth in the current version of Annex IV.

The Act to Prevent Pollution from Ships, the Ocean Dumping Act, and the Refuse Act

The Act to Prevent Pollution from Ships (33 USC 1901-1915) implements MARPOL in the United States. This Act, in conjunction with MARPOL, prohibits the discharge of oil, hazardous liquid substances carried in bulk, hazardous substances carried in packaged form, and garbage from vessels in the waters subject to the jurisdiction of the United States. Other U.S. laws are relevant to discharges, so it is not possible to refer only to one of these for a comprehensive treatment of the subject. Besides the Clean Water Act and MARPOL, discussed in this manual, the others include the Ocean Dumping Act (33 USC 1401, et seq.) and the Refuse Act (33 USC 407). All of these laws apply to different aspects of the discharge or deposit of substances or material deemed harmful to the marine environment into waters subject to the jurisdiction of the United States.

Resources and Contacts

Pumpout Facilities

Call the U.S. Fish and Wildlife Service at 800-ASK-FISH (or 800-275-3474) to find out where the nearest pumpout facilities are located, anywhere within the United States.

To Report Sewage Spills and Other Pollution

In the U.S., if you observe any boat not complying with water pollution regulations, report it to the U.S. Coast Guard Marine Safety Office (MSO). Call the toll free Coast Guard hotline at 800-368-5647 to locate the MSO near you.

Clean Vessel Act Grant

Marinas located on navigable fresh or saltwater bodies that service recreational vessels are eligible to receive funds to improve or install sewage facilities. If you do not currently have pumpouts or waste reception sites, contact your local U.S. Fish and Wildlife office for more information. Or go to the federal domestic assistance page at <http://aspe.os.dhhs.gov/cfda/p15616.htm#i17>

Visit the following websites for more information on sewage pollution and prevention:

The Ocean Conservancy Website

www.oceanconservancy.org

U.S. Coast Guard Website

www.uscg.mil



U.S. Coast Guard Auxiliary

For information on the Vessel Safety Check (VSC) program, boater education, and other boating safety related issues: www.cgaux.org

U.S. Power Squadron

For information on boater safety and education programs, and boating related issues: www.usps.org

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- ¹ Florida Department of Environmental Protection. <http://www.dep.state.fl.us> (accessed August 2000)
- ² SeaLand Technology, Inc. *Clean Water Notebook: Ecological Impact of Boat Sewage Discharge*, Big Prairie, Ohio: SeaLand Technology, Inc., 1994.
- ³ Florida Department of Environmental Protection. <http://www.dep.state.fl.us> (accessed August 2000)
- ⁴ Coast Alliance. *Pointless Pollution: Preventing Polluted Runoff and Protecting America's Coast*, Coastal Alliance, Washington, D.C.
- ⁵ National Resources Defense Council. (1998). *Fish Contamination Advisories Rise*. <http://www.nrdc.org/find/wacatch.html> (accessed August 2000)
- ⁶ Environmental Health Center. *Coastal Challenges: A guide to Coastal and Marine Issues*. Washington, D.C., 1998.

VESSEL MAINTENANCE AND REPAIR

What it is and Where it Comes From

In the *Good Mate* program, *vessel maintenance* is considered to be surface cleaning, washing, waxing, and other maintenance such as regular inspections of through-hull fittings. *Vessel repair* is considered to be sanding, grinding, painting, repairing plastic, and hull scrubbing. This discussion applies to marina and boat cleaning activities that take place in or out of the water, but are not of an industrial shipyard nature. Engine maintenance activities such as changing oil and oil filters and fuel line repair are discussed in the oil and fuel section.

Traditional antifouling paints rely on copper to prevent fouling. Typically, copper makes up 40 to 75 percent of the active ingredients, in the form of cuprous oxide. The paint works because it is “contact leaching.” That is, because the paint is semi-porous it allows the copper to chemically leach out as water comes into contact with it, thus preventing the growth of algae, barnacles, and other organisms on the boat’s hull. More copper tends to be released when the paint is new; the release rate gradually tapers off as the paint ages, which leads to more fouling problems. To prolong the life of this type of paint, more copper is added to the mix.

The environmental impact of small quantities of copper leaching from antifouling paints is far from clear, but it is known that copper in high concentrations is toxic. At this time, the most that can be said is that copper in paint may affect the environment adversely in the long term.¹ Copper causes galvanic corrosion on aluminum hulls, so paints using tin compounds often are substituted.

Tin compounds have been found to prevent fouling on all types of hulls, but these materials also have environmental and health side effects.² Tributyltin (TBT), one of the most highly effective and environmentally dangerous antifouling agents, was used on hundreds of thousands of recreational vessels before regulatory controls were put in place in 1989. TBT is believed to be responsible for deformed and dying oyster beds. The Environmental Protection



Agency eventually classified these compounds as restricted-use pesticides in the United States.³ Regulations in the United States and Europe now prohibit the application of most types of tin paints, except to aluminum hulls, and then only by trained and certified professional technicians. TBT paints are still available in some parts of the world.⁴ A draft resolution up for review before the International Maritime Organization Marine Environment Protection Committee would ban all new TBT applications on commercial ships by 2003 and would prohibit the compound completely by 2008.⁵

Congress regulated the use and application of TBT with passage of the 1988 Organotin Antifouling Paint Control Act, which restricts the method of application, type of applicator, and size of vessel that may use antifouling paints containing TBT. In response, paint manufacturers have tried to reduce the toxicity of marine paints while preserving antifouling and textural benefits. The search for new materials that will both improve antifouling performance and longevity, and be kind to the environment, has led companies to add compounds called biocides or algacides to their paints as well as other antibiotic compounds, pre-ceramic coatings, and even chili pepper extract.⁶

Normal maintenance goes beyond painting your boat. It includes keeping your boat in good, safe operating condition, cleaning it regularly, replacing and properly recycling your battery, inspecting emergency flares yearly to ensure they work properly, and regularly inspecting for leaks of your vessel's through-hull fittings.

Impacts

Impacts on the Environment

Depending on the method used, vessel sanding and cleaning can lead to increased particulate matter entering the water column. Such material inhibits the ability of sunlight to penetrate the water column, which inhibits photosynthesis and the ability of aquatic grass beds to grow. Reduced aquatic grass beds reduces the ability of many small organisms that depend on the grasses to thrive and grow, while also reducing the grasses' ability to hold sediment in place. The net effect is overall poor quality water that is practically devoid of aquatic life.

Cleaners and detergents may add nutrients (e.g., phosphorus, nitrogen) to local waters. Excess nutrients degrade water quality and promote excess algae growth that leads to algal blooms. An *algal bloom* is the massive reproduction of tiny, single-celled algae. Increased algal growth leads to increased competition for oxygen. An overpopulation of algae eventually leads to a great decrease in oxygen in the water that can literally lead to the suffocation of fish and other aquatic animals.

Impacts on Species

Many cleaning products are safe to use in our homes because household wastewater is usually treated at treatment plants before being discharged into local waterways. However, when used on boats, those same cleaners can be discharged directly into the water without any treatment, and hence may be lethal to aquatic life.

Cleaning products often contain ingredients such as ammonia, phosphate, chlorine, and hydrocarbon byproducts that can be toxic to aquatic life. The most damaging pollutants are those that persist and tend to increase in concentration as they are transferred through the food chain.⁷ Any substance that is hazardous to our health can be deadly to an aquatic organism. Burning eyes and irritated skin are indications that the product is hazardous.

When exposed to chemical degreasers, finfish lose the natural oils required for oxygen exchange along their gills, and the fish may suffocate. Detergents reduce the amount of oxygen in the water, impair gill function in fish, and reduce the ability of seabirds to stay warm and dry.⁸ Metal ions, such as zinc and copper, can attach themselves to gill membranes and inhibit oxygen exchange. The result is reduced appetite, poor swimming performance, slow growth rate, and reduced reproductive capability.

The leaching of toxins from antifouling paints on a vessel's hull kills biological organisms that attach themselves to the hull.⁹ However, the toxins may also be absorbed by oysters, worms, and other aquatic life and be passed up the food chain to fish, birds and mammals, including humans. Toxins may also accumulate in bottom sediments,¹⁰ where they have the potential to remix with the water during subsequent bottom disturbances, such as channel dredging or storms.

In addition to cleaning and painting activities, marine vessels often use batteries that should be replaced yearly to ensure they will operate properly and pyrotechnics (flares) that need to be inspected annually to insure their use in an emergency. Most batteries contain lead and/or cadmium, both of which are detrimental to the environment. Cadmium is potentially toxic and may accumulate in fish tissue, and lead is known to have severe and chronic effects upon humans, especially on children. Flares contain phosphorus and may degrade after numerous "sweatings," so they should be stored in a dry, airtight, but easily accessible container. Because of their toxicity, flares and batteries should be disposed of only in approved containers and locations (see Best Management Practices, below).

Impacts on the Economy

The closure of any inland or coastal aquatic area due to chemical contamination can have a devastating impact on local economies and hurt future tourism trade. Chemical pollution can take years to clean up and can cost millions of dollars.



What Can I Do About It?

Marinas, as well as individual boaters, must play a role in reducing the pollution associated with vessel maintenance and repair. One way is to incorporate best management practices (BMPs) into daily marina operations and boating activities. BMPs are management measures that ensure environmentally responsible behavior. The following are some BMPs that boaters and marinas can implement to reduce vessel maintenance and associated vessel repair pollution.

Best Management Practices for Boaters

WASHING AND CLEANING YOUR BOAT

To stop toxic cleaning products from entering the nearshore waters, boaters should:

- Rinse their boat only with fresh water after each use. A good, freshwater rinse can help stop organism growth and will extend the life of the boat's protective paint coating. Rinsing after each use also reduces the need for cleansers and heavy-duty products.
- Look for catch basins or other collection systems at the posted wash areas of your marina, and use them. Such systems stop paint resins, chips and other hazardous products from entering the aquatic environment. If your marina does not have such a system, encourage them to install one.
- Use old-fashioned and less harmful cleaning methods, including baking soda, vinegar, lemon juice, borax, and "elbow grease."

Selecting soaps and cleaning products:

- Ask your marina store to stock environmentally friendly cleaning products as alternatives to harsh cleansers. Boaters should purchase the least toxic product available to do the job. Examine the warning label. If it is hazardous to humans, it is hazardous to the aquatic environment.
- Look for the words "phosphate-free" and "biodegradable" on the product label.
- Buy only what you need. The smaller the product container, the smaller the potential spill.
- Keep open cleaning products away from the open deck.
- Clean spills with a rag (instead of hosing); make sure you dispose of the rag safely or stow it to clean other spills.
- Share your leftover supplies with other boaters or dispose of them safely and properly onshore according to product labeling or the marina operator.

SANDING AND SCRAPING YOUR BOAT

Sanding and scraping a boat can release paint and varnish particles into the air and water around you. Toxic dust particles can irritate a person's lungs and eyes and can also affect the health and reproductive systems of fish, birds, crabs, and other sea life. It is important boaters contain their mess as much as possible. The following are some tips for do-it-yourself boat scrapers:

- Conduct all sanding and scraping on shore, away from the water and preferably in a dedicated work area.
- Use a vacuum sander, a tool that collects and stores paint particles before they get into the water or into your eyes and lungs.
- Lay tarps under the work area to catch loose particles and use a vacuum to remove the loose material. If a vacuum is not available, lift the tarp, collect the scrapings into a sealed container, and dispose of it on shore.

PAINTING YOUR HULL

Keeping a boat bottom free of algae, barnacles, and other growth ensures smooth, fuel-efficient boat operation. Consider using some of the less damaging boat paint alternatives mentioned on page 28. They effectively protect the hull without harmful pesticides and metals. Some contain ingredients such as silicone or Teflon, while others contain intense concentrations of organic ingredients, such as cayenne pepper. All paintwork should be conducted on shore in a dedicated work area using a tarp to capture drips and spills.

Encourage other boaters to learn more about the laws applying to boat bottom paints as well as alternative painting products by contacting the EPA, their state boating agency, and their local marine supply store.

Other ways to slow organism growth:

- Rinse and wipe the hull with fresh water after each use.
- Apply a good coat of wax with "elbow grease" each season.
- Dry dock or haul the boat after each use; this may totally eliminate the need for antifouling paints.

MAINTAINING BOAT OPERATIONS

Performing routine maintenance on a boat and its engine can improve boat and engine operation. A clean, well-operating boat lasts longer and reduces the amount of pollutants entering the water. Boaters can keep their vessels in top working condition by:



- Tuning the engine regularly. In turn, the engine will operate more cleanly, increase its fuel efficiency, and last longer.
- Steam cleaning the engine in a dedicated service area, rather than using harmful engine cleaners.
- Inspecting the fuel lines routinely. **Failure to properly maintain a fuel system can lead to a catastrophic explosion.** Unleaded fuels can contain alcohol, which corrodes rubber hoses. If there are signs of deterioration – dry, cracked areas or soft, tender spots – replace the hoses immediately with fresh ones marked “USCG Type A.” The Coast Guard has also approved an alcohol resistant fuel hose: SAEJ1527.
- Regularly inspecting its through-hull fittings, such as the depth finder transponder and cooling water intakes, for leakage. A sinking vessel not only poses a great safety risk to its passengers but an unmanned vessel sinking at its dock or anchorage can introduce a substantial amount of fuel, oil, and chemicals into the water.
- Using non-toxic bilge cleaners. Many bilge cleaners are harmful to the environment since they merely break down oil into microscopic fragments that are pumped out in the bilge water. Several non-toxic

bilge cleaners actually contain microbes that digest hydrocarbons rather than emulsifying them. A marine dealer should have more product information.

- Disposing of all maintenance products and chemicals properly. Do not throw them in the water or down a storm drain.
- Learning more about hazardous waste disposal by contacting the city, county, or state boating agency and department of environmental quality.

MAINTAINING SAFETY EQUIPMENT

Take care when disposing of batteries and flares. Lead acid batteries should be delivered to a lead acid battery retailer or wholesaler for proper disposal, or to a collection or recycling facility authorized by the Environmental Protection Agency or your state’s department of environmental quality. Expired marine flares can be kept on board as a back-up for new flares (but new flares should be kept separate from the old flares), or donated to vessel safety training programs. If they must be disposed of unused, they should be treated as hazardous waste. Contact the appropriate agency in your state for proper disposal requirements. For more information see Appendix C.

Best Management Practices for Marinas

Common management strategies that are relatively easy to implement include the following:¹¹

- Conduct all repair work and maintenance in designated work areas. These areas should be surrounded by berms, and have an impervious floor to contain spills and make sweeping up easier. Sweep the work area frequently. Operations such as pressure washing, steam cleaning, sanding, painting, repairing and constructing fiberglass, varnishing, and woodworking are best suited for these areas.
- In outdoor work areas the work must be performed over tarpaulins if there is no hard surface to aid cleanup. Sweep and vacuum the tarps frequently. Cover storm drains near the work area to prevent waste from being carried into marina waters by the storm water. Vacuum hull maintenance areas regularly to remove trash, sanding, paint chips, etc.
- Install water catch basins or other collection systems in boat wash areas.
- Scrubbing and using abrasives on boat bottoms while in the water create pollution. *A plume of blue or red when a bottom is being scrubbed means that copper particles are being released into the water column.* Scrub only hard finish bottom paints in the water. Gently sponging soft painted bottoms will not release as much paint, and the paint job will last longer.
- Pay special attention to traditional teak cleaners, which are caustic. They contain strong chemicals for bleaching the teak. *Any product that recommends the user to wear rubber gloves or take special safety precautions is harmful to the environment as well.* Mild soaps, scrub brushes, and water washdowns will keep teak decks non-skid and clean.
- Reuse thinners and solvents whenever possible. Let the particles settle, and then drain off the clear solvent for reuse. The sludge is hazardous waste and should be disposed of according to local regulations.
- Plastic sheeting used to protect surfaces should also be dried out and reused rather than discarded.
- Encourage boaters to read the product warning labels and wear appropriate clothing and equipment to protect their skin, lungs, and eyes from injury.

Also:

- Make environmentally friendly cleaning and maintenance products available to your customers.
- Provide a place, such as a clearly marked bin outdoors, for boaters to deposit batteries and unusable flares and empty the bin regularly.

- Educate boaters on the potential harm caused by cleaners and detergents that contain ammonia, bleach, sodium hypochlorites, and petroleum distillates.

In addition, post these tips (or insert them with purchases as a flyer) for marina visitors and customers:

- Rinse and wash your boat with fresh water in a contained area every time you take it out of the water.
- If your vessel is in the water, wash it by hand using fresh water. *Remember: more frequent cleaning with less potent materials will be much kinder to the environment.*
- Use phosphate-free, biodegradable detergents and cleaning compounds.
- Wax your boat every year — a good coat of wax will prevent surface build-up.
- Remove the vessel from the water to perform above- and below-waterline scraping, sanding, plastic repair, painting, and barnacle removal. Keep the vessel in a contained area.
- Capture and contain particulate matter when working on your boat.
- Perform maintenance activities in dry-dock or another enclosed area.
- Dispose of batteries and flares properly. Batteries should be given to marina staff or taken to local municipal/government recycling centers. Flares should be given to marina staff or local law enforcement agencies. **Do not discard batteries or flares into a dumpster. They are toxic waste!**

Regulations

The primary regulations governing vessel maintenance activities focus on the use and disposal of cleaning materials and associated paint and repair work. Local solid waste statutes and the 1988 Organotin Antifouling Paint Control Act govern the disposal of used cleaning materials, empty containers, and unused paints. The Clean Water Act prohibits the discharge of harmful quantities of pollution into waters of the United States, and each state has its own specific regulations. Under the Clean Air Act, marinas need to be cognizant of volatile organic compound (VOC) limits for marine paints. Boaters should use and marinas should stock only marine paints that comply with local, state, and federal VOC limits. It is recommended that marina operators contact their respective state and local governments prior to boat painting, as well as city and county governments and local waste haulers, to determine restrictions or limits on waste disposal options.

Resources and Contacts

Waste Disposal Information

Call your local Solid Waste Department if you have questions about solid waste disposal, waste reduction, household chemical disposal, or recycling.

Hazardous Waste Disposal Information

The Environmental Health and Safety Online site, http://www.ehso.com/EHSO_HazWaste.htm, has links to state agencies and contacts.

Air and Water Emissions

Additional information on proper management strategies to reduce particle emissions to the environment may be obtained by contacting your local Department of Environmental Quality.

To Report Pollution

If you observe any boat not complying with water pollution regulations, report it to the U.S. Coast Guard Marine Safety Office (MSO). Call the toll-free Coast Guard hotline at 800-368-5647 to locate the MSO near you.

Visit the following websites for more information on boat maintenance pollution and prevention:

The Ocean Conservancy Website

www.oceanconservancy.org

U.S. Coast Guard Website

www.uscg.mil

U.S. Coast Guard Auxiliary

For information on the Vessel Safety Check (VSC) program, boater education, and other boating safety related issues: www.cgaux.org

U.S. Power Squadron

For information on boater safety and education programs and boating related issues: www.usps.org

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SOLID WASTE AND DEBRIS

What it is and Where it Comes From

Solid waste, trash, and litter, after being discarded into the aquatic environment, are known as marine debris. Examples include plastic, foamed plastic, wood products, building materials, product packaging, earthen products (concrete, iron, metal), paper, tires, fishing gear, glass, bottles, and other discarded material. In other words, **when talking about marine debris we are talking about trash and litter.** The technological strides of the industrial age have led to the creation of products that fail to decompose – or break down extremely slowly – in the environment. As an example, plastic and other marine debris may remain in the environment for hundreds, even thousands, of years.

Another form of marine debris is the all-too-common cigarette filter. For the tenth year in a row, cigarette filters retained their dubious distinction of being the number one reported item during The Ocean Conservancy's annual International Coastal Cleanup, with volunteers in 2000 finding more than **1.3 million**. One yet-unpublished student thesis indicates that enough cigarette filters are casually discarded each year to equal the weight of 9,600 space shuttles. In addition to not breaking down quickly in the marine environment, they also contain toxic compounds that may affect various animals, including humans.¹

Marine debris originates from two primary sources: ocean and inland waterways, and the land. Land-based sources account for approximately 70% of marine debris; ocean and inland waterway-based sources account for approximately 30%. Still, the National Academy of Sciences estimated that in the early 1970s, ocean sources (maritime commercial and recreational traffic, the military, oil platforms, and other sources) dumped approximately 14 billion pounds of garbage into the sea every year² while commercial fishing fleets added another 26,000 tons of plastic packing material. Ocean disposal of solid waste has been illegal in the United States since 1989.

We know that behind every piece of trash and litter is a person who failed to follow proper disposal practices. Every three months, the average American throws away their weight in product packaging. Every day, the average



American discards about 3 1/2 pounds of trash. Solid waste is a real problem! But this problem also has a simple solution. Proper management of personal, commercial, and industrial waste will reduce the volume of marine debris, trash, and litter while improving the aesthetic and economic value of our natural resources.

Impacts

Marine debris is an acute eyesore and a visual pollutant. Its effects are found throughout the world, from high-density recreation areas such as coastal Florida to secluded beaches and uninhabited islands. Debris in the ocean knows no boundaries. Wind and ocean currents distribute debris all over the world.

Impacts on Human Health and Safety

In addition to being ugly, marine debris can pose a serious threat to humans. Some debris is classified as hazardous, such as medical waste that gets flushed down sewers and into coastal areas. Broken glass and metal pieces in the sand can injure unwary children and other beachgoers. In the water, marine debris can be even more dangerous. Monofilament line wrapped around a vessel's propeller may be more than just an inconvenience; it could stall the boat, leaving its occupants stranded at sea.

Impacts on the Environment

The very properties that make plastic so useful on land – light weight, durability, and water resistance – make plastic a serious hazard to wildlife. Monofilament fishing line, balloon ribbons, ropes, and netting or other materials can entangle flippers, or become wrapped around beaks and muzzles. In addition, transparent plastics, like sandwich bags, are virtually invisible under water and unsuspecting animals can swim into it, or even swallow it. Some animals even seek out plastic bags, because they resemble jellyfish. But ingesting a sandwich bag or other plastic can block the digestive tract and kill the bird or animal – a high price to pay for improper human behavior.

It is difficult to estimate the total number of debris related wildlife injuries and deaths; however, entanglement and ingestion incidents have been reported for at least 267 species of animals, including at least 43 percent of the world's marine mammals, at least 44 percent of the world's seabird species, and all but one of the world's sea turtle species. The vast majority of these reports are from the carcasses of dead animals found on beaches or sightings of animals that return to shore to molt, breed, nest, or simply rest.³

About 70 percent of the dead sea turtles that undergo necropsies (animal autopsies) contain some form of plastic in their digestive tract. In one case, a sea turtle found on a Hawaiian beach had swallowed an eight-inch square plastic bag, plus a golf tee, shreds of bag and sheeting, pieces of monofilament fishing line, a plastic flower, part of a bottle cap, a comb, chips of polystyrene, and dozens of small, round pieces of plastic.⁴

Not all species affected by marine debris live in the water. Many species of birds are killed as a result of entanglement. Monofilament line is an especially lethal type of debris. In one case in Florida, environmentalists found a piece of fishing line with seven dead pelicans entangled in its length—monofilament line can kill more than once! Data indicates that monofilament line may persist for over 600 years before breaking down—if ever.⁵

Impacts on the Economy

Marine debris can cause direct economic impacts and damage to boats, as when propellers become wrapped with fishing line or seawater intakes are clogged with debris. Debris can also deplete a coastal community's finances, with increased beach cleaning costs. The indirect costs, though, are perhaps even greater.

Marine debris is ugly and dangerous. Its presence discourages people from partaking in coastal activities, such as recreational fishing, boating, swimming, or

beachgoing. It even repels tourists from visiting coastal areas. Coastal communities rely on seaside businesses, and the clientele that support them, for their economic survival. Clean beaches promote tourism and economic health. Dirty beaches do just the opposite.

What Can I Do About It?

Marinas, as well as individual boaters, must play a role in reducing solid waste pollution. One way is to incorporate best management practices (BMPs) into daily marina operations and boating activities. BMPs are management measures that ensure environmentally responsible behavior. The following are some BMPs that boaters and marinas can implement to reduce solid waste pollution.

It is illegal for any U.S. boat anywhere in the world, or any foreign boat in U.S. waters, to dispose of plastics or most other solid debris by discharging it overboard. (For more on the specific regulations, see *Regulations* on page 36.)

Once back on shore, however, there are several ways boaters and marinas can keep trash from entering the water. Follow the three “R”s—Reduce, Reuse, and Recycle. Reduce the amount of disposables you buy or stock. Pay particular attention to unnecessary packaging. Careful planning and purchasing habits, such as purchasing items in bulk or in concentrated form where possible, can reduce the amount of packaging that must be discarded. Marinas can also reduce the initial amount of packaging waste by not purchasing double-packaged items when ordering maintenance, store, or facility supplies. Reuse materials whenever possible, either for their original purpose or a new one, such as using plastic milk jugs as bailers. Finally, discard materials appropriately, either in the trash or recycling bin.

Best Management Practices for Boaters

Boaters often witness trash being dumped or see debris floating on the water's surface. The very waters to which they retreat are dirtied by garbage. It is important everyone knows how to be part of the solution to water pollution.

Boaters can help by:

- Using garbage facilities – trash cans, dumpsters, and recycling bins at their boatyard or marina. If the garbage facilities are inadequate, request better services from the facility manager.
- Promoting and utilizing waste and oil recycling at their dock, marina, or port.

- Making sure no trash is discarded, washed, or blown overboard. If an item does blow overboard, go back and retrieve it! (Use this opportunity to practice “man-overboard” drills).
- Practicing “Plus-One Boating.” Bring back everything you take out, plus one piece of litter from someone else’s wasteful wake.
- Participating in a beach cleanup, especially in remote areas accessible only by boat. For information on the annual International Coastal Cleanup, call The Ocean Conservancy at 1-800-262-BEACH.
- Reporting any illegal dumping you witness to the local USCG Marine Safety Office (see *Resources and Contacts*, below).
- Reminding others that plastic garbage generated aboard a vessel may not be discharged into the water but should be brought ashore for proper disposal.

Best Management Practices for Marinas

For items that can be recycled, set up recycling bins for staff and customers. Call your local department of environmental quality to find out what materials are recycled in your area. Make sure the bins are clearly labeled. For items that cannot be recycled, provide adequate, convenient garbage receptacles and empty them frequently. Also set up special collection bins for hazardous materials, such as batteries, flares, and other items that contain metal and/or chemical components. Again, check with your local solid waste management authority for specific regulations.

For larger or commercial vessels using your marina, help them set up systems to segregate their waste into recyclable components; this will improve the on board waste management process and reduce the vessel’s waste disposal costs in port. Recyclables can represent up to 30% of the total waste produced by each vessel.

In addition to practicing proper disposal at your marina, make sure your customers know how to reduce and eliminate marine debris. These tips can be reproduced on posters or a counter display:

- Do not allow any debris to be thrown overboard – you are the Captain! You can also be fined for violating the law.
- After any boating, fishing, or beach outing, bring all your trash back for disposal onshore.
- Do not throw cigarette butts overboard. Filters are non-biodegradable, contain toxic chemicals, and may persist for years.
- Avoid disposable goods; purchase reusable products or containers.

- Save and reuse plastic bags when possible.
- Recycle your plastic, metal, glass, and paper products at the marina or other facility.
- Dispose of monofilament fishing line into trash receptacles. DO NOT throw overboard.
- Educate all passengers about the law, as well as the impacts to the marine environment from improperly discarding trash.

Regulations

There are several federal and state regulations designed to control, monitor, and enforce the ban on ocean disposal of waste. In the United States, the Coast Guard (USCG) is the primary enforcement agency but individuals may also contact local marine patrol units if they see or suspect a violation. See *Resources and Contacts*.

MARPOL 73/78

In 1973, the International Convention for the Prevention of Pollution from Ships at Sea (Marine Pollution) was drafted and signed by several seafaring nations. In 1978, it was updated to include five annexes on ocean dumping. In 1997, an annex on air pollution by ships was added. By ratifying MARPOL 73/78, a country automatically adopts annexes I and II; the remaining annexes are optional. The United States has ratified optional annexes III and V.

- Annex I Oil
- Annex II Hazardous liquid carried in bulk
- Annex III Hazardous substances carried in packaged form
- Annex IV Sewage
- Annex V Garbage
- Annex VI Air Pollution

An optional annex goes into effect only after countries representing 50 percent of the world’s shipping tonnage have ratified it. However, once ratified, an optional annex applies only to those countries that have ratified it.⁶

Annex V prohibits the at-sea disposal of all plastics. It also limits the ocean discharge of other types of garbage at specified distances from land. Annex V restrictions apply to all ocean-going vessels – recreational as well as commercial. Annex V went into effect in waters of the United States on December 31, 1988 when Congress passed the Marine Plastic Pollution Research and Control Act (MPPRCA).

Marine Plastic Pollution Research and Control Act

As mentioned above, Congress passed the Marine Plastic Pollution Research and Control Act (MPPRCA), which implemented Annex V in U.S. waters. This law specifically prohibits the overboard disposal of plastics anywhere in the world by U.S. vessels. In addition, it prohibits the disposal of plastics by any foreign or domestic vessel within U.S. waters. The law also regulates the disposal of non-plastic items depending on a vessel's distance from shore.

The MPPRCA requires all vessels 26 feet or longer to have a MARPOL placard displayed on board. A MARPOL placard illustrates distances from shore and the materials that may be thrown overboard. Vessels 40 feet or longer that are engaged in commerce or have a galley and berthing area must also have a waste management plan and logbook on board. Waste management plans are designed to inform the crews about standard refuse practices applicable to the vessel.

The U.S. Coast Guard is the enforcement agency for MARPOL within the Exclusive Economic Zone (EEZ) of the United States, which extends 200 miles from shore. The Coast Guard cannot catch every violation, and relies on sharp-eyed citizens to report MARPOL violations. If you observe any boat not complying with water pollution regulations, document the event and report it to the USCG Marine Safety Office (MSO) or your local Marine Patrol. See *Resources and Contacts* for more information.

Resources and Contacts

Solid Waste and Recycling Information

Call your local Solid Waste Operations Department if you have questions about disposal of solid waste, used oil, household chemicals, or questions about recycling.

Six-Pack Ring Recycling

To recycle plastic six-pack ring holders, contact the marina, your local recycling center, or ITW Hi-Cone. ITW Hi-Cone is a producer of six-pack rings and supports a vigorous recycling program. Six-pack rings can be brought to a local recycling center or mailed to ITW Hi-Cone, Attn: Recycling Dept., 1140 W. Bryn Mawr Ave, Itasca, IL 60143-9918; 630-773-9300.

To Report Pollution

If you observe any boat not complying with water pollution regulations, report it to the USCG Marine Safety Office (MSO). Call the toll-free Coast Guard hotline at 800-368-5647 to locate the MSO near you.



MARPOL Placards

To obtain a MARPOL placard that illustrates distances from shore and the materials that may be thrown overboard, contact the USCG Marine Safety Office (MSO) in your community or The Ocean Conservancy at 202-429-5609 (See sample above).

Visit the following websites for more information on marine debris pollution and prevention:

The Ocean Conservancy Website

www.oceanconservancy.org

U.S. Coast Guard Website

www.uscg.mil

U.S. Coast Guard Auxiliary

For information on the Vessel Safety Check (VSC) program, boater education, and other boating safety related issues: www.cgaux.org

U.S. Power Squadron

For information on boater safety and education programs, and boating related issues: www.usps.org

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STORMWATER RUNOFF

What it is and Where it Comes From

Stormwater runoff is a natural process in the environment. Throughout a watershed (an area of land that drains water, usually thousands of square miles) rainwater travels hundreds of miles downstream through streams, lakes, rivers, and eventually the ocean. As the water travels, however, it usually picks up pollution along the way, pollution that also gets deposited in coastal waters.

Stormwater runoff is a type of non-point source pollution. That is, it cannot be traced to a single source, such as a municipal sewage pipe or industrial site. Stormwater runoff can pick up fertilizers and animal waste from agricultural fields; grass clippings, litter, and household chemicals from urban and suburban streets; oil and other automotive substances from roadways and parking lots. Erosion problems upstream also contribute tons of soil to runoff, soil that eventually enters coastal waters.

In marinas, the principal pollutants in runoff come from parking areas and hull maintenance areas. Some of these include toxic metals from boat hull scraping and sanding, other suspended solids, organics (oil and grease), detergents, litter, and hazardous bilge waste.

Impacts

Polluted stormwater runoff can severely harm water quality, wildlife, and their habitats, which ultimately affect local economies. Although any single runoff event may be small, it is the cumulative effect of many small inputs that is so destructive.

Impacts on the Environment

Sediment is made up of minerals and organic matter that is transported by runoff as a result of coastal and upstream erosion. When the runoff flow is light, sediments quickly drop to the bottom, starting with the densest and coarsest material first. During times of heavy water flow sediment remains suspended in the water. The finest sediments can remain in suspension a long time.

Excessive amounts of sediment in runoff creates several problems. Suspended sediments can reduce



water clarity, interfere with animal respiration and digestion, and block sunlight through the water column, which affects plants that require light for photosynthesis. Sediment deposition can smother plant and animal life throughout the water column, but especially on the bottom. Sediments often contain heavy metals, pesticides, and other pollutants as well. Waterways, channels, and marina basins can be filled in by excess sediment, leaving us with increased dredging and dredge spoil disposal costs.

On the surface of the water, a small amount of oil or other petroleum product can contaminate a large area of water – a single quart of oil can create a two-acre slick, about the size of three football fields.

Impacts on Species

Petroleum products, such as fuel, oil, and other engine wastes, can reduce growth, alter feeding behavior, and lower the reproductive rates of many aquatic organisms. In addition, these toxins foul shorelines, pollute surface water, reduce light transmission, and reduce oxygen exchange at the water's surface. Fish and shellfish larvae are extremely sensitive to even very low levels of petroleum compounds. Petroleum products also contain toxic metals.

Nutrients, such as phosphorus and nitrogen, enter the runoff “stream” through sewage, detergents, agricultural and lawn fertilizers, animal waste, and yard waste. Small amounts of nutrients are necessary for the healthy development of a natural ecosystem, but excessive nutrients can disrupt the natural balance of an ecosystem.

Algae are single-celled organisms that are important beginnings of most food chains or food webs in the aquatic environment. Algae use light for photosynthesis to produce their food. This process in turn produces oxygen that supports animal life in the water. Excessive nutrients act as a “fertilizer” and stimulate algal growth, creating what is called an *algal bloom*. Once the overabundant algae begin to naturally decay, dissolved oxygen in the water can be depleted. This process increases the biological oxygen demand of an ecosystem and leads to foul odors and resultant harm to aquatic life, such as fish kills.

Toxic organics and heavy metals can pollute stormwater runoff as a result of industrial activities, automobile emissions, boat cleaning, pesticide use, and illicit sewer connections. Toxic organics include pesticides and certain cleaning chemicals. Heavy metals include lead, copper, zinc, and mercury from paints and batteries. Once in the water, toxins do not degrade; they can persist in bottom sediment for years. Toxins can accumulate in bottom-dwelling animals and continue to increase in concentration as they move up the food chain. Pesticides and other toxins cause genetic defects, reproductive abnormalities, and increased mortality rates in sensitive animal species, especially waterfowl. A study of pregnant women who consumed PCB-contaminated fish from Lake Michigan reported an increased number of children born with smaller heads and slower reflexes.¹

Pathogens, such as bacteria and viruses, are introduced into runoff through human sewage and animal wastes. Contamination may pose a health risk through direct exposure (swimming and other water-contact activities in contaminated water) and through consumption of shellfish from contaminated water. Pathogens, including streptococci, fecal coliform, and other bacteria, can cause infectious hepatitis, diarrhea, bacillary dysentery, skin rashes, and even typhoid and cholera. The most common pathogen is fecal coliform bacteria, found in the intestines of all warm-blooded animals. Fecal coliform causes the most commonly reported ailment due to polluted water—acute gastroenteritis.² Children, elderly people, and those with weakened immune systems usually react more severely to contaminated water.

The most visible pollutants in stormwater runoff are small pieces of street litter, such as cigarette filters, plastic coffee stirrers, and bottle caps and lids. Seabirds and other marine wildlife are known to eat this trash, mistaking it for food like fish eggs or larvae. The animal can choke on the trash, or the trash can then accumulate in the animal’s digestive tract, causing the animal to slowly starve to death.

Impacts on the Economy

Because stormwater runoff contains fuels, oils, sewage, litter, and other pollutants, it affects the economy in the same way these pollutants do individually.

An area degraded by litter, sewage, oil, or chemical pollution will lose the tourists who want to vacation in a pristine, natural area. This, in turn, will hurt businesses that rely on tourists — hotels, restaurants, chartered fishing boats, and SCUBA/snorkeling tours.

If oil and fuel pollution have significantly damaged the protective wetlands, aquatic grasses, mangroves, other coastal plants, or reefs there will be damage to property as well. These buffers need to be strong and healthy to protect inland areas from strong winds, storm surges, and excessive erosion.

Waters contaminated by sewage look bad and smell worse. Medical care and cleanup costs also become a factor when human health and safety are compromised. In addition, revenue is lost when commercial and recreational fishing activities are suspended following shellfish bed and fishing area closures.

Coastal communities rely on seaside businesses, and the clientele that support them, for their economic survival. Clean water promotes tourism and economic health. Dirty water does just the opposite.

What Can I Do About It?

Marinas, as well as individual boaters, must play a role in reducing stormwater pollution. One way is to incorporate best management practices (BMPs) into daily marina operations and boating activities. BMPs are management measures that ensure environmentally responsible behavior. BMPs can be structural or non-structural. The following are some BMPs that boaters and marinas can implement to reduce stormwater pollution.

Best Management Practices for Boaters

- Select nontoxic cleaning products that do not harm humans or aquatic life.
- Fuel boats carefully, recycle used oil, and discard worn motor parts into proper receptacles to prevent needless petroleum spills. Keep boat and auto motors well tuned to prevent fuel and lubricant leaks and improve fuel efficiency.
- Dispose of trash, including cigarette filters, properly in onshore bins. If bins are overflowing, alert marina staff.

- Xeriscape. That is, landscape with native, drought-resistant vegetation. Conserve water by watering only as needed. Water at night to minimize evaporation and direct sprinklers to grassy areas, not the pavement.

Best Management Practices for Marinas

STRUCTURAL BMPs

Structural BMPs are excellent environmental protection alternatives that can be implemented in marinas; some of these suggestions are especially valuable in areas with no access to conventional water treatment systems or advanced pollution prevention systems. These practices rely on two different processes to treat runoff: filtration and detention. *Structural BMPs may require a state permit. Seek the advice of your state Department of Environmental Protection or Department of Natural Resources before proceeding.* We also suggest you consult with a professional marina design engineer with experience in designing these types of structures.

- **Filtration practices**, which reduce the impact of runoff by using vegetation or sand near the marina to filter and settle pollutants. After being filtered, the stormwater runoff can be routed into drainage channels, guts, or other bodies of water. Or it can be left to evaporate or infiltrate the surrounding soil. Types of filtration systems include:
 - **Buffer strips** – areas of vegetated land separating the marina's operation areas from the water. They are designed to filter sheet flow-type stormwater runoff. They may resemble natural ecosystems, for example grassy meadows. The vegetative cover helps sediment settling and pollutant removal.
 - **Grassed swales** – shallow, vegetated ditches to which all runoff is directed for slow filtration. The bottom elevation must be above the water table to allow runoff to infiltrate the surrounding soil. The vegetation prevents erosion, filters sediment, and provides some nutrient uptake. Instead of a ditch, a berm or other barrier can sometimes be designed to route stormwater flow to a grassed swale or other treatment area.
 - **Sand filters** – closed, self-contained beds of sand where stormwater runoff percolates downward to be collected in underground pipes and reused for irrigation or returned back to a drainage channel or gut. Enhanced sand filters use layers of peat, limestone, and/or topsoil. Like buffer strips, they may also have a grass cover to improve pollutant removal. A variation of this system, sand trenches, have been developed specifically to treat parking lot runoff.

- **Detention practices**, which settle and retain suspended solids and associated pollutants. They temporarily impound runoff to control its rates and velocities. All detention practices use settling to remove particulates (sediments, organic matter, etc.). Some detention practices include:

- **Extended detention ponds** – temporarily detains a percentage of stormwater runoff for up to 24 hours after a storm, allowing solids and pollutants to settle out. These ponds usually stay dry between storm events.
- **Constructed wetlands** – engineered systems designed to imitate the function of natural wetlands to treat and contain stormwater runoff and to decrease pollutants to coastal waters. They attempt to replicate all of the functions of natural wetlands including enhanced wildlife habitat and scenic areas.

Other structural BMPs include retention ponds that settle sediment before it reaches the ocean. Runoff is channeled into these permanently filled ponds and remains for an extended period of time, allowing solid particles and pollutants to settle to the bottom. The clearer water is then reintroduced into the waterway.

NON-STRUCTURAL BMPs

- Maintain proper functioning of all marina equipment. Monitor equipment for proper use. Inspect and maintain sewage disposal facilities regularly.
- Provide onshore restrooms and encourage their use. Be sure they are adequate in number for your marina. Maintain and clean them on a regular schedule.
- Xeriscape. That is, landscape with native, drought-resistant vegetation. Conserve water by watering only as needed. Water at night to minimize evaporation and direct sprinklers to grassy areas, not the pavement.
- Use water-based paints in place of more toxic, oil-based paints for parking lots and other landscaping needs.
- Keep storm drains properly maintained and cleaned. Stencil messages near storm drain inlets on your property to educate boaters about the direct link between storm drains and nearby waters.
- In the United States and its territories report any boat not complying with water pollution regulations to the U.S. Coast Guard Marine Safety Office. See *Resources and Contacts*. Or contact the local environmental enforcement office for information on local water pollution regulations.

Regulations

Clean Water Act

In 1972 Congress passed the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act (CWA). Its mission was to “restore and maintain the chemical, physical, and biological integrity of the nation’s waters.” The CWA set up a permit system to limit industrial and municipal discharges and to protect wetlands. Also, states were required to adopt water quality standards with federal government oversight.

Section 402 of the CWA (33 USC 1342), the National Pollutant Discharge Elimination System (NPDES) Program, makes it illegal for municipal and industrial facilities to discharge pollutants into navigable waters unless they have an authorized permit. EPA or a designated state issues permits, and discharge reports are made available to the government and the general public.

Section 319 of the CWA (33 USC 1329) required states to assess and develop control programs for non-point sources. It authorized EPA to approve state management programs to provide implementation grants.

Under section 6217 of the 1990 amendments to the Act, EPA and the National Oceanic and Atmospheric Administration (NOAA) developed guidance specifying management measures for non-point source pollution affecting coastal waters.

Resources and Contacts

Solid Waste and Recycling Information

Call the local Public Works or Solid Waste Operations Department if you have questions about disposal of solid waste, used oil, household chemicals, or questions about recycling.

Xeriscaping

To learn more about landscaping your property with native vegetation as a way to reduce stormwater pollution and conserve water, contact your local Agricultural Cooperative Extension Service. Another source is the Natural Resources Conservation Service (NRCS) from the Department of Agriculture: www.nrcs.usda.gov.

Storm Drain Stenciling

To find out how you can stencil storm drains at and near your marina, contact The Ocean Conservancy’s Office of Pollution Prevention and Monitoring in Virginia Beach, VA at 757-496-0920.



To Report Pollution or Sewage Spills

In the United States, if you observe any boat not complying with water pollution regulations report it to the toll-free Coast Guard hotline at 800-368-5647.

To Report a Fish Kill

If you discover a fish kill, report it to your state’s Department of Fish and Wildlife.

Visit the following websites for more information on stormwater runoff pollution and prevention:

The Ocean Conservancy Website

www.oceanconservancy.org

U.S. Coast Guard Website

www.uscg.mil

U.S. Coast Guard Auxiliary

For information on the Vessel Safety Check program, boater education, and other boating safety related issues: www.cgaux.org

U.S. Power Squadron

For information on boater safety and education programs and boating related issues: www.usps.org

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VESSEL OPERATION DAMAGE

What it is and Where it Comes From

Vessel operation damage occurs whenever a boat causes damage to the environment through improper handling, irresponsible use, or vessel maintenance neglect. This can occur when a boat is anchored improperly, is operated in shallow water or runs aground in a sensitive area, is operated without regard to aquatic animals, or is improperly maintained or neglected, resulting in the sinking of the vessel. Vessel operation damage can be costly.

It is the responsibility of all boat owners to assure that their boat is seaworthy. An “un-seaworthy” vessel is not only a threat to the safety of its passengers but also poses an environmental hazard. Neglected or un-maintained vessels are at greater risk of sinking, releasing fuel, oil, sewage, and toxic chemicals into the water.



An additional problem is the introduction of an aquatic nuisance species (ANS). An ANS is a species that is not native to local waters but is brought by some means, such as ballast water, discarded bait or exotic fish species, escape from aquaculture, or hitchhiking on a traveling vessel. Although some species may not survive such a transition, many do thrive in their new environments. Since many of these invading species have no natural predators in their new environments, they are often free to reproduce unchecked. In addition, they can alter the ecosystem by preying voraciously on native marine life. The zebra mussel, European ruffe, round goby, and spiny water flea are examples of species that have recently invaded U.S. waters.

Impacts

Impacts on the Environment

A metal anchor and dragging chain set down in a sensitive habitat can gouge and abrade aquatic grass beds and coral reefs. An improperly laid anchor can also dredge damaging rifts into the bottom, uprooting and destroying important plants that serve as feeding and nesting grounds for the thousands of species of underwater life.

Navigating a vessel through shallow waters can cause significant environmental damage, as well as pose a safety hazard. As boats travel into shallow water, their propellers may cut into the aquatic grass beds, often trenching the bottom, removing all grass blades, rhizomes, and even sediment. **This is particularly true of personal watercraft that use powerful water jet propulsion systems.** Natural recovery of damaged rhizomes takes from three to ten years.¹

Underwater damage caused by a single anchor or propeller may seem rather small – a small nick in an aquatic grass bed or coral reef. However, the effects of many of these individual incidents add up to long-term damage to these fragile ecosystems. For example, aquatic grass will seldom regrow in exposed sandy scars. Damaged coral often invites disease, further damaging the reef. Consequently, the combined effect of these scratches and nicks can be quite dramatic.

Excessive wake in sensitive areas such as bays, rivers, and lakes can damage shorelines and nearshore habitats. An uncontrolled wake can damage sensitive water plants, erode and even collapse entire embankments. The force of an uncontrolled boat wake can also heavily damage shoreline docks and moored boats, and injure people along the shoreline as well. Remember – you are responsible for your wake!

Impacts on Species

Traveling at high speeds in shallow waters stirs up ground sediments. Such turbulence not only affects aquatic plants and bottom dwelling organisms, but it also impairs a boater's ability to see sandbars, submerged obstacles, dangerous shoals, or surfacing aquatic animals – such as manatees, otters, and sea turtles, among others.

Besides the risk of physically injuring animals, there are also risks associated with the close contact of boaters and aquatic life. Disturbing animals forces them to move away from you – interrupting feeding or sleeping and causing them to expend energy they need to survive. Any activity that forces a protected or endangered animal to change its behavior is considered harassment. And the harassment of protected or endangered animals is illegal. In the United States, protected aquatic animals include migratory waterfowl (ducks, geese, swans, egrets, herons), river otters, beavers, and marine mammals including all whales and dolphins, all seals and sea lions, all sea turtles, sea otters, and manatees.

Impacts on the Economy

Operating a boat in shallow water can cost a lot of money in expensive repairs. Sand and gravel churned from the bottom can damage a boat's engine. A grounded boat can have costly propeller damage or hull damage. And damage from excessive boat wakes can cause extensive shoreline property damage.

An aquatic nuisance species invasion can have significant economic impacts. By altering the environment, ANS can deplete populations of commercially valuable native species. And in the case of the zebra mussel, an ANS with a penchant for clogging intake pipes at drinking water, power generation, and industrial facilities, the cost to the Great Lakes region alone for nuisance control was about \$5 billion in 2000.

What Can I Do About It?

Marinas, as well as individual boaters, must play a role in reducing vessel operation damage. One way is to incorporate best management practices (BMPs) into daily marina operations and boating activities. BMPs are management measures that ensure environmentally responsible behavior. The following are some BMPs that boaters and marinas can implement to reduce vessel operation damage.

Best Management Practices for Boaters

GET EDUCATED

As a boat owner and operator **you have a responsibility** to yourself, your passengers, and the aquatic environment to know how to properly and safely operate your vessel! There are numerous boating operation and safety courses available to the public. The best resources for boating safety education are the U.S. Coast Guard Auxiliary, the U.S. Power Squadron, your state boating departments, and various boating organizations. These courses offer training in areas such as vessel operation, navigation, proper emergency procedures, safety equipment, pollution control, and proper vessel maintenance.

One easy way to protect yourself and the sensitive bottom habitats and aquatic grass ecosystems is simply to avoid the shallows. But as these shallow sensitive habitats may grow within inches of the water's surface, whether inland or offshore, avoiding them can be tricky. Fortunately, there are several navigation tips that can help make boating easier and safer.

KNOW YOUR COLORS?

The color of the water can give you a good indication of what is below the surface.

- *Brown, Brown, Run Aground:* Bottom formations that grow close to the water's surface and shallow aquatic grass beds will make the water appear brown. Such areas should be avoided to keep from running aground and damaging both your boat and these sensitive habitats.
- *White, White, You Might:* Sand bars and shallow rubble areas appear white. These areas can be deceiving and may be much shallower than they appear. Navigate with caution around these areas.
- *Green, Green, Nice and Clean:* Green water usually indicates areas free of shallow areas or aquatic grass beds. Navigation of small, shallow draft boats in these areas is generally safe. However, larger shallow draft boats should exercise caution. All boaters should carry and consult current and corrected copies of the appropriate NOAA marine chart.
- *Blue, Blue, Cruise on Through:* Deep-water areas, such as the ocean side of a reef, may appear blue. Navigation in these areas is free from hazardous contact with reefs or aquatic grass beds. Remember, however, that reefs and rocks rise abruptly from deep water, so give yourself plenty of room to maneuver.

The generalizations above can be very helpful, but keep in mind that these colors might not be so apparent if there is extreme cloud cover, a glassy calm sea state, extreme sun glare, or murky water. Polarized sunglasses can be very helpful in distinguishing the color of the water.

KNOW YOUR MARKERS³

“No Wake” Markers: Usually prominently marked on pilings or shoreline structures such as bulkheads, docks, or piers.

Reef Light Towers: A prominent metal A-frame structure with a number posted on it.

Shoal Markers: Solitary steel I-beams, rising above the water, usually with a diamond shaped **DANGER** sign attached.

Reef Light Towers or Shoal Markers mark many extensive shallow reef areas. **Do Not Approach These Areas!** You can determine where the shallow edge of these areas is located by observing the water. Along the reef there will be a series of breaking waves. Along the edge of seagrass flats, there will frequently be a ripple effect or a surface water texture change. Shallow sandbars will appear glassy.

ANCHORING

Anchoring, if performed correctly, poses little threat to you, your property, or to the environment. If boaters use the appropriate ground tackle for the type of bottom—sand, mud or rock—they are generally ensured a safe hold. To properly anchor a boat, a boater should check the charts or use a depth finder to locate appropriate holding grounds. Never anchor over sensitive reefs or aquatic grass beds.

To ensure safe moorings and to make sure an anchor is not scarring a sensitive ecosystem, you should:

- Use existing mooring buoys as much as possible. Keep in mind that some mooring buoys are located near extremely shallow reefs. **DO NOT** attempt to motor across a reef to reach a mooring buoy.
- Hail other boaters moored or anchored in the area. They may know of additional safe anchoring beds or set moorings.
- Check the holding potential of the bottom by looking at the nautical chart or by conducting a visual examination, with the sun at your back, of the bottom area.
- Lower the anchor gently over the side of the boat.
- Use the depth sounder to identify anchoring areas, especially if the waters are murky.

- If sensitive reefs or aquatic grass beds are detected, boaters should:
 - Set anchor in a nearby sand, gravel, or mud area. The size of the anchorage area must be large enough and far enough away from the reef or aquatic grass so that the anchor chain does not drag across or chafe the sensitive habitat. If a safe anchoring location cannot be found, move to deeper water.
 - Direct incoming boaters to other appropriate anchorages you may have found.

If the anchor chain is grumbling, weigh anchor or move to another spot. This noise is an indication that the boat is anchored over a reef or other rocky substrate.

RUNNING AGROUND

To ensure safe passage, you should:

- Consult an official and corrected nautical chart.
- Follow channel markers and heed buoy warnings.
- Use the depth sounder.
- Pay attention to the water patterns. Shoals and shallow areas can be detected early on if the boater pays attention to the surface water in the vicinity of the vessel.
- **Always wear your life jacket** while on board and have personal flotation devices (PFDs) readily available if needed in an emergency.



If you should run aground:

- DO NOT try to motor your way out! Instead, if in a small boat use a paddle or an oar to pole your way out in the direction from which the boat entered. If in a larger vessel radio, call, or hail for assistance or a tow.
- Have the phone number or monitored radio frequency of your local tow service readily available on your boat.

OBSERVING MARINE LIFE

It is important that boaters follow proper wildlife interaction procedures and know the restrictions placed on interaction with wildlife, particularly aquatic mammals and sea turtles.

As a rule, boaters should always slow their boat when approaching an aquatic animal. Many states and natural park areas have pre-set safe-distance requirements between a boat and wildlife. When observing an aquatic animal, maintaining a safe distance of 100 yards is generally the rule (500 yards is required for the highly endangered northern right whale). However, always check local regulations.

It is illegal under federal law to feed, harass, molest or injure aquatic mammals such as whales, dolphins, manatees, or sea otters. Anyone witnessing such actions is asked to report the incident to the U.S. Coast Guard or local marine police as soon as possible. See *Resources and Contacts*.

AQUATIC NUISANCE SPECIES

Most ANS invasions worldwide are thought to be due to the uptake and discharge of ballast water from ships. However, recreational boaters can also spread exotic species when boats or equipment are moved from one body of water to another or unused bait is dumped into the water.

To avoid ANS invasions, adopt the following procedures:

- When leaving the water, inspect your boat and remove all hitchhiking animal and plant life from the hull, trailer, propeller, intake areas, and all equipment.
- Drain and flush engine cooling system, live wells, bilge, and bait buckets with very hot water if possible. If hot water is not available, use tap water.
- Rinse your boat and all areas that get wet (including trailer frames and wheels, safety light compartments, decking, and the lower portion of the motor cooling system) with tap water. DO NOT use salt and/or chlorine water mixtures. Runoff of these mixtures could enter the waterway, where they would be harmful to native aquatic organisms. Also, these mixtures can damage boat equipment.

- Air-dry your boat and other equipment three to five days before using in a new water body. Some ANS, like the zebra mussel, can live for at least 48 hours out of water.
- DO NOT dump unused bait or its packing material into the water. While bait may be bought locally, it is often shipped from farther away.

MAINTAIN A SEA-WORTHY VESSEL

- Regularly inspect your boat's through-hull fittings, such as the depth finder transponder and cooling water intakes, for leakage to reduce the risk of sinking. A sinking vessel not only poses a great safety risk to its passengers but an unmanned vessel sinking at its dock or anchorage can result in a substantial introduction of fuel, oil, and chemicals into the water.
- Always conduct a visual inspection of your boat after a particularly hard rain. Accumulated rain in the bilge can quickly over burden a bilge pump system, and cause the vessel to sink.

Best Management Practices for Marinas

Marinas can help by maintaining up-to-date charts and alerting boaters to sensitive habitats in your area, protected species they may encounter and safe-distance requirements, and the potential dangers of aquatic nuisance species. Also, marina operators should conduct a visual inspection of all vessels in their marina to spot any that appear to be neglected or pose a threat of sinking at the dock or polluting the surrounding waters.

Regulations

Marine Mammal Protection Act

The Marine Mammal Protection Act (16 U.S.C. §§1361 et seq.) prohibits the harassment of endangered or threatened marine mammals, such as whales, dolphins, seals, sea lions, sea otters, and manatees.

Endangered Species Act

The Endangered Species Act prohibits the catching, collecting, transporting, harming, or killing of any animal or plant species designated as endangered or threatened. For a complete list of endangered and threatened species, visit the U.S. Fish and Wildlife Service's website at <http://endangered.fws.gov/wildlife.html>.

Resources and Contacts

USCG Recreational Boating Information

www.uscgboating.org/

NOAA Navigational Charts

<http://chartmaker.ncd.noaa.gov/ocs/text/prices.htm#>
Charts for prices on charts and for a link to local Authorized Nautical Chart Sales Agents.

Local Boating Guides

Available through your local marina or bookshop.

Aquatic Nuisance Species Information

Aquatic Nuisance Species Task Force at
www.anstaskforce.gov

U.S. Coast Guard Auxiliary

For information on the Vessel Safety Check program, boater education, and other boating safety related issues, call your local U.S. Coast Guard Auxiliary Flotilla or check their website at www.cgaux.org

U.S. Power Squadron

For information on boater safety and education programs, and boating related issues, visit their website at www.usps.org

National Association of State Boating Law Administrators (NASBLA)

For state specific boating safety education and other boating related issues visit the following website:
www.nasbla.org

Visit the following websites for more information on environmentally safe vessel operation:

The Ocean Conservancy Website

www.oceanconservancy.org

U.S. Coast Guard Website

www.uscg.mil

References

¹ National Park Service, US Department of the Interior. (April 1998). *Natural Resource Year in Review*.
http://www.aqd.nps.gov/pubs/yr_rvw97/chapter01/chapter01_a02.html
(accessed August 2000)

² Florida Keys National Marine Sanctuary. (November 23, 1999). *Keeping Your Bottom Off the Bottom*.
http://www.fknms.nos.noaa.gov/edu/keeping_your_bottom.html
(accessed August 2000)

³ Ibid

APPENDIX A: NATIONAL RESPONSE CENTER (NRC)

The National Response Center (NRC) is the sole federal point of contact for reporting oil and chemical spills.

If you have a spill to report, call them toll-free at: **1-800-424-8802 or 202-267-2675.**

For additional information on reporting requirements and procedures visit their website: **www.nrc.uscg.mil**.

The following is an abbreviated version of the information available on the NRC website.

NRC Responsibilities

The primary function of the National Response Center is to serve as the sole national point of contact for reporting all oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories. In addition to gathering and distributing spill data for Federal On-Scene Coordinators and serving as the communications and operations center for the National Response Team, the NRC maintains agreements with a variety of federal entities to make additional notifications regarding incidents meeting established trigger criteria. Details on the NRC organization and specific responsibilities can be found in the National Oil and Hazardous Substances Pollution Contingency Plan while a simplified discussion of the NRC's tasking is outlined below.

The NRC is staffed by Coast Guard personnel who maintain a 24-hour per day, 365-day per year telephone watch. NRC watch standers enter telephonic reports of pollution incidents into the Incident Reporting Information System (IRIS) and immediately relay each report to the predesignated Federal On-Scene Coordinator (FOSC).

The data that is collected by the NRC is made available to the general public under the Freedom of Information Act (FOIA) and can now be queried on-line via the web site (www.nrc.uscg.mil). Or detailed data searches can be filled at a nominal charge by mailing your request to:

United States Coast Guard (G-CIM)
2100 2nd Street, SW
Washington, D.C. 20593-0001
ATTN: FOIA

Reporting An Incident

The NRC maintains a 24-hour per day, 7-day a week, 365-day a year Operations Center where all information is received via the toll-free number, entered directly into an on-line data base system, and electronically disseminated as part of the National Response System. Once contacted, the NRC Duty Officer will guide the caller through a detailed series of questions based on the Standard Report Form to gather as much information as possible concerning the spill or release. When any of the following incidents occur, the NRC should immediately be contacted by the responsible party via the toll-free number. If you see or discover an oil spill or release of chemicals and are NOT the responsible party, you should contact the NRC with whatever information you have.

Reporting A Recreational Boating Accident

Under Title 33 CFR 173-4, the operator of any recreational vessel must report any accident that results in:

- Loss of life
- Personal injury which requires treatment beyond first aid
- Damage to the vessel and other property exceeding \$500.00
- Complete loss of the vessel

Boat operators are required to report their accidents to the authorities in the state where the accident occurred. Should you witness an accident, report it as soon as possible to the nearest authority to insure a timely response by rescue and pollution personnel.

Oil Spills

Section 311(b)(5) of the Federal Water Pollution Control Act requires that the responsible party notify the National Response Center as soon as knowledgeable of an oil spill from a vessel or facility operating:

- In or along U.S. navigable waters;
- On the Outer Continental Shelf;
- In a deepwater port; or
- From a vessel transporting oil from the Outer Continental Shelf.

Chemical Releases

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires that all releases of hazardous substances (including radionuclides) exceeding reportable quantities be reported by the responsible party to the National Response Center.

Transportation Accidents

Transportation accidents involving hazardous materials, including radioactive substances, must be reported to the National Response Center immediately by the carrier when, as a direct result of the materials:

- A person is killed;
- A person receives injuries requiring hospitalization;
- Property damage exceeds \$50,000; or
- Fire, breakage, or spillage of an etiologic agent occurs.

Further details can be found in 49 CFR 171.15.

What Information Does The NRC Need?

Who you are:

- Your name, address and phone number.
- The name, address and phone number of the responsible party, if known.
- Anonymous calls are accepted.

What happened:

- What material was released?
- How much was released?

Where it happened:

- City, County, State
- Location, nearest street corner or landmark.

When it happened:

- When did it happen?
- When did you discover it?

Why it happened:

- How did it happen?
- What caused the discharge?

What if you do not have all the above listed information?

We still want and need your call. You might be providing the NRC with the first indication that a major incident has occurred. For a complete and detailed listing of the information collected by the NRC, check out the Standard Report Form at <http://www.nrc.uscg.mil/report.htm>.

APPENDIX B: NO-DISCHARGE ZONES

U. S. No Discharge Zones

Courtesy of the Environmental Protection Agency

The Clean Water Act (CWA) Section 312 provides States the opportunity to request certain water bodies to be designated as “no-discharge” zones. Upon approval from the Environmental Protection Agency (EPA), the discharge of sewage from a vessel within a no discharge zone, whether treated or untreated, is prohibited. The EPA publishes a Federal Register (FR) notice to announce a State’s request and approval for the designation of a body of water as a non-discharge zone.

Please note: This list is subject to change. For the most up to date listing visit the U.S. Coast Guard website:

<http://www.uscg.mil/hq/g-m/mse/nodiszones.htm>

State (alphabetical)	Waterbody	Federal Register Notice	Effective Date
California	Mission Bay	41 FR 34353	8-13-76
California	Oceanside Harbor	41 FR 34353	8-13-76
California	Dana Point Harbor	41 FR 34353	8-13-76
California	Channel Islands Harbor	44 FR 26963	5-8-79
California	Oxnard	44 FR 26963	5-8-79
California	Avalon Bay Harbor	44 FR 26963	5-8-79
California	Santa Catalina Island	44 FR 26963	5-8-79
California	Newport Bays	41 FR 2274	1-15-76
California	Sunset Bay	41 FR 2274	1-15-76
California	Richardson Bay	52 FR 33282	9-2-87
California	Huntington Harbor	41 FR 2274	1-15-76
California/Nevada	Lake Tahoe	42 FR 59105	11-15-76
Florida	Destin Harbor	53 FR 1678	1-21-88
Massachusetts	WestPort Harbor	59 FR 45677	9-2-94
Massachusetts	WellFleet	60 FR 30539	6-9-95
Massachusetts	Waquoit Bay	59 FR 11271	3-10-94
Massachusetts	Nantucket Island	57 FR 44379	9-25-92
Massachusetts	Wareham Harbor	57 FR 2553	1-22-92
Michigan	All	41 FR 2274	1-15-76
Minnesota	Boundary Waters Canoe Area	42 FR 43837	8-31-77
Minnesota	Mississippi River (part)	42 FR 33362	6-30-77
Minnesota	Minnesota River (part)	42 FR 33362	6-30-77
Minnesota*	St. Croix River	61 FR 30868 42 FR 37844	6-18-96 7-25-77

(Continued)

State (alphabetical)	Waterbody	Federal Register Notice	Effective Date
Missouri	All (except Miss. River, Missouri River, part of Bull Shoals Lake)	40 FR 54462	11-24-75
New Hampshire	All (except coastal waters)	40 FR 36797	8-22-75
New Jersey	Shark River	63 FR 30742	6-5-98
New Mexico	All	41 FR 17599	4-27-76
New York	Lake Champlain	41 FR 24624	6-17-76
New York	Mamaroneck Harbor	62 FR 223	11-19-97
New York	Lake George	41 FR 2668	1-19-76
New York	Hudson River (part)	60 FR 63941	12-13-95
New York	Hudson River (part)	60 FR 63941	12-13-95
Rhode Island	Block Island	58 FR 31202	6-1-93
Texas	24 Freshwater bodies	42 FR 59776	11-21-77
Vermont	All (including parts of Lake Champlain and Lake Memphremagog)	40 FR 42240	9-11-75
Wisconsin	All (except Lake Superior, Mississippi River, part St. Croix River)	41 FR 11875	3-22-76

APPENDIX C: MAINTAINING BOAT SAFETY EQUIPMENT

A Minimum Recommended List of Boat Safety Equipment

Courtesy of the U.S. Coast Guard Boating Safety Division

At the beginning of each boating season, every owner of a recreational boat should conduct a thorough inspection of his or her boat and all of its equipment prior to that first outing. This will insure a fun and safe boating season. The following is the minimum equipment to be inspected for most boats.

- **Personal Flotation Devices (PFDs)** – USCG approved, in good and serviceable condition, one wearable for each person on board of the appropriate size stowed in a readily accessible manner, and a throwable device (if required) stowed in an immediately available location.
- **Visual Distress Signals** – 1) Pyrotechnic devices (flares; smoke) USCG approved, not expired, in good and serviceable condition, in sufficient number, stowed in a readily accessible manner. 2) Non-pyrotechnic devices (day flag; night auto SOS lantern) USCG certified, in good and serviceable condition, batteries in good charge (lantern), stowed in a readily accessible manner.
- **Fire Extinguishers** – USCG approved, in good and serviceable condition, properly charged as per the gauge, of appropriate size and type for length of vessel (B-I or B-II), recommend mounting outside entrance to galley and engine room spaces.
- **Ventilation** (for enclosed machinery with gasoline as its fuel) – All vent hoses and cowls are free of obstruction, vent hose has no holes or tears, exhaust hose is above the normal level of bilge water, blower (if fitted) is operable and all wiring is free of cuts and abrasions.

- **Backfire Flame Control** (for gasoline engines only) – USCG, SAE, or UL approved, external mounted device should fit tightly to carburetor and is free of damage, if fitted re-breather hoses are connected, device should be free of dirt and oil build up for more efficient engine operation.
- **Sound Producing Devices and Bells** – If required, insure horn emits a clear audible sound, horn bells are free of water and obstructions, and portable horns using canned propellant are full. For mouth-operated horn, make sure you can make a constant sound for at least 6 seconds in duration. It is recommended having at least one back up device such as a police whistle. For a bell, if required, insure clapper is attached to bell, and bell emits a clear, bell-like tone.
- **Navigation Lights** – Check all lights to insure they burn bright and clear, are free of obstruction, lenses are of the appropriate color (red = portside; green = starboard side) and not cracked. Check all positions of light switch to make sure the lights displayed agree with the switch positions.
- **Navigation Rules** – If required, have a book for ready reference. It is recommended that you maintain an updated copy, as rules change from time to time.
- **State and/or Local Requirements** – Be sure to check for any additional safety requirements through your state and local boating agencies.

To insure that your vessel is truly ready for the water, have a free Vessel Safety Check conducted by your local U.S. Coast Guard Auxiliary or U.S. Power Squadron. This vessel safety check is a courtesy examination of safety equipment carried or installed on a vessel and certain aspects of the vessel's overall condition. VSC requirements parallel Federal and State requirements with regard to equipment and vessel condition. If the vessel meets or exceeds the VSC requirements, the examiner will award the owner or operator a Vessel Safety Check Decal. The VSC is not a law enforcement action and is not conducted by, nor is any information obtained or provided to any law enforcement organization. It is a free public service provided in the interest of boating safety.