



*Charting a Course to Clean Water*

# GOOD MATE

Recreational Boating & Marina Manual



[WWW.OCEANCONSERVANCY.ORG/GOODMATE](http://WWW.OCEANCONSERVANCY.ORG/GOODMATE)





1

**B** **BE A LEADER IN YOUR COMMUNITY**

Talk about marine litter prevention with members of your boating community, from your neighbor in the next slip to boating clubs and marina managers.



2

**O** **OFFER YOUR TIME**

Volunteer in boat and marina cleanup programs, especially at sites only accessible by boat. And participate in Ocean Conservancy's annual International Coastal Cleanup, the largest volunteer effort of its kind for the ocean.



**Good Mate's**  
**5**



**Ways**

*Boaters Can Protect Our Ocean and Waterways*

3

**A** **ACCIDENTS HAPPEN**

Be prepared with absorbent pads to clean oil or fuel spills. Dish soap doesn't work. It just causes those liquids to sink and contaminate the bottom.



5

**S** **SET THE PACE**

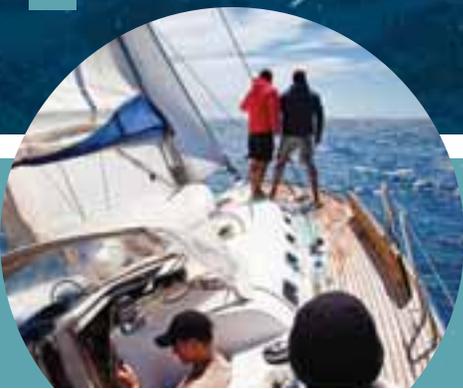
Recycle everything you can, from beverage containers to propeller-snarling fishing line or plastic bags.



4

**T** **TAKE IT ALL BACK TO SHORE**

Don't allow cigarette butts to go overboard; small but significant, they are the most prevalent marine litter item found during the International Coastal Cleanup. Dispose of them properly onshore.



**FOR ADDITIONAL TIPS VISIT**  
[www.oceanconservancy.org/goodmate](http://www.oceanconservancy.org/goodmate)

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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 marine operations. We strongly suggest that all concerned individuals contact the appropriate governmental agency to determine legal requirements.

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## INTRODUCTION

As a boater or marina operator, you are in a unique position to be a leader in water protection. You've seen the impacts: Quite quickly, a wonderful boating experience—the scenery, the freedom and the time with family and friends—can take a bad turn when discarded fishing lines or plastic bags wrap around a propeller, or large floating items scratch or damage a hull. The moment your boat is damaged, you feel the repercussions not only in your leisure time but also in your wallet.

You also know firsthand the damage carelessness can inflict on rivers, lakes and the ocean where you cruise. Pollution from cleaning products, sewage and oil or fuel take a toll on water quality. Pollution makes the things we love to do on the water—swimming, fishing and watching wildlife—somehow less complete, less inspiring. Marine pollution poses health hazards to humans as well.

The good news is that every boater and marina operator can take simple, practical steps to protect the waters that our lives and recreation depend on. Those actions, multiplied across the entire boating community, add up.

Working in collaboration with the U.S. Coast Guard (USCG) and Coast Guard Auxiliary, Ocean Conservancy created Good Mate, a public outreach program aimed at reducing and eliminating marine pollution and environmental degradation. Ocean Conservancy's Good Mate program gives you simple, easy-to-follow guidelines for green boating. And by sharing what you learn from Good Mate with the greater boating community, you can bring even more people on board and truly make a difference.

## GOAL AND OBJECTIVES

The Good Mate program's primary goal is to help recreational boaters and marina staff gain a better understanding and awareness of how they can help protect waterways while enjoying their recreational boating activities.

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

- Helping boaters and marinas develop and incorporate environmentally friendly management strategies in six areas: oil and fuel, sewage pollution, vessel maintenance and repair, marine debris, stormwater runoff and vessel operation.
- Educating and training recreational boaters and marina staff to be informed and educated stewards of waterways.
- Helping boaters and marinas realize economic benefits while promoting environmentally friendly procedures.
- Fostering cooperation between groups interested in the use, quality and enjoyment of local waters.
- Keeping boating fun by maintaining a safe, pleasant and clean environment.

## ORGANIZATION

The Good Mate 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.

The manual is divided into seven chapters: Chapters 2–7 are designed to be used independently or in conjunction with the other chapters, depending on a boater's or marina's specific requirements. This training manual is also intended for use by marina supervisors when introducing new staff to the Good Mate program.

Each chapter follows a standard sequence: first identifying or defining the pollutant and explaining the potential impacts to people, wildlife and the environment; and then discussing potential management strategies and alternatives. Any applicable regulations, resources and references are included at the chapter's conclusion.

For the purpose of the Good Mate program, the term "pollutant" is defined as any substance, manufactured item or living 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.

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 jurisdictions.





# THE WATER ENVIRONMENT



1





## WATER

Of all the resources on 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.

Although water covers nearly 75 percent of the Earth's surface, nearly all of this water is either permanently frozen or salty, leaving **only one percent of the Earth's water fit for human consumption.**<sup>1</sup>

Water also supports our livelihoods. In the United States alone, commercial and recreational fishing, boating, tourism and other coastal industries provide millions of jobs nationwide and contribute billions to the U.S. economy.

## ECOSYSTEMS

### OCEAN

The vastness of our planet's ocean is difficult to comprehend. The enormity of these waters can only be fully seen from outer space. The ocean covers over 70 percent of the Earth's surface, contains 95 percent of all water on Earth and contains 95 percent of the habitat space on the planet. The ocean is home to the world's largest animal, the blue whale, as well as the tiniest microscopic plankton. In 2010, the sea provided 7.9 billion pounds of fish for human consumption.<sup>2</sup>

The ocean touches the lives of virtually all Americans, regardless of whether we live in a coastal community or deep in the heartland. One out of six jobs in the United States is marine related.<sup>3</sup> In 2009, the ocean (and Great Lakes) economy provided 2.6 million jobs and generated \$223 billion.<sup>4,5</sup> Almost 80 percent of U.S. imports and exports travel through seaports,<sup>6</sup> and at least one out

of every two Americans lives within 50 miles of the coast.<sup>7,8</sup> Coastal and ocean commercial fisheries provide \$70 billion to the nation's economy each year.<sup>9</sup>

## COASTAL WATERS

Coastal waters—areas of ocean extending from the shore to about 5 miles out to sea—are where most of us enjoy our recreational activities, including sunning, fishing, surfing and boating. Coastal waters are also very profitable. More than 80 percent of the U.S. economy comes from coastal states.<sup>10</sup> Coastal watershed counties provided 69 million jobs and contributed \$7.9 trillion to the 2007 gross domestic product.<sup>11</sup> Coastal tourism and recreation supports 1.7 million jobs and pumps \$70 billion into the economy.<sup>12</sup>

However, as more and more Americans live, work and play along the coast, our activities and actions are having greater environmental impacts. Today, over half of the U.S. population lives along the coast.<sup>13</sup> Along with increasing coastal populations comes increasing coastal pollution, mainly from polluted runoff. In agricultural areas, pesticides, fertilizers and animal waste 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 in storm drains, which bypass sewage plants and directly enter our waterways.

Large amounts of sediment from construction sites enter our waters each year, which can reduce vital sunlight required by plankton, smother sea grass 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 2013 there were 1,504 beach closures or advisories issued in the country due to high levels of bacteria or pollution.<sup>14</sup>



## Estuaries

Estuaries are special transition areas between land and sea formed wherever fresh water from rivers, creeks or streams mixes with salt water from the sea. These areas include bays, lagoons, harbors, inlets, marshes, sloughs, sounds or swamps. A few familiar estuaries include Boston Harbor, Chesapeake Bay, Puget Sound and Tampa Bay. These unique ecosystems—affected by the tides but sheltered by land—have many important environmental, cultural and economic functions.<sup>15</sup>

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. This reduces the amount of sediments and pollutants that could enter the open ocean and creates cleaner, clearer water.<sup>16</sup> Estuarine wetlands also protect the uplands, acting as flood control, absorbing floodwaters and dissipating storm surges.<sup>17,18,19</sup>

Estuaries provide cultural, educational and aesthetic benefits, and support a host of activities, including boating, fishing, swimming and bird-watching.

Estuaries also support the economy in many ways. While comprising only 13 percent of the U.S. continental land area, estuary regions host 43 percent of the country's population, 40 percent of its employment and 49 percent of the nation's output.<sup>20</sup> They provide habitat for more than 75 percent of America's commercial fish catch and an even greater percentage of the recreational fish catch.<sup>21</sup>

## Sea Grass Beds

Another special coastal habitat is the sea grass bed. Sea grasses, such as eel grass, turtle grass and manatee grass, are flowering plants that live entirely underwater in salt water and brackish water. Sixty species are found worldwide.<sup>22</sup> Like land plants, they produce oxygen used by fish and other marine life. Their roots and rhizomes stabilize the bottom sediment, much like land grasses slow soil erosion. The leaves slow water flow, which allows silt to settle on the bottom and trap fine sediments and other particles. Both of these functions help maintain water clarity, which increases the amount of light reaching the sea grass beds.<sup>23</sup>

Sea grass beds also provide habitat for many fish, crustaceans and shellfish. They serve as nurseries for certain fishes and other marine life. The algae and small animals that colonize the leaves provide food for juvenile fish while sea urchins, green turtles and manatees eat the leaves themselves. As the sea grass decays, it becomes food for microbes, shrimp, fish and invertebrates. In Florida's Monroe County, sea grass beds supported an estimated \$13.9 million in stone crab, spiny lobster, shrimp, snapper and blue crab catch in 2010.<sup>24</sup>



### 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. They survive in the salty water by excreting salt through their leaves or by blocking the absorption of salt at their roots. Like sea grasses, mangroves benefit the overall ecosystem by trapping and cycling organic materials, chemicals and nutrients. They also stabilize the coastline, reduce the effects of erosion and provide shelter for fish and other organisms.<sup>25</sup>

### RIVERS

Rivers are bodies of fresh water fed by smaller tributaries flowing from upland sources. 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 floodplains. There are more than 250,000 rivers in the United States, covering 3.5 million miles.<sup>26</sup> The Mississippi River, the country's largest river, carries an average of 436,000 tons of sediment every day<sup>27</sup> and deposits 500 million tons of sediment downstream into the Gulf of Mexico annually.<sup>28</sup>

Rivers are home to a large number of plants, animals, fish, amphibians and reptiles. River habitat food webs are greatly dependent upon the surrounding landscape and can be severely affected by human activity. Detritus, or decaying plant material, from the land is the primary food source in a river system. Runoff carries detritus into creeks, streams and rivers where plankton consume it. The plankton are eaten by newly hatched fish, crustaceans or water insects, which are themselves food for other commercially and recreationally valuable fish species. Increased runoff due to development or deforestation, or runoff polluted by toxic chemicals, can harm the entire riverine food web.

Rivers also provide a great deal of our drinking water. Approximately 65 percent of Americans' drinking water comes from rivers and streams.<sup>29</sup> Rivers are very vulnerable to polluted runoff. Pesticides, fertilizers and animal waste enter our rivers from agricultural areas, while a toxic brew of oil, grease and other chemicals enters rivers from storm drains and parking lots in urban areas. The result? According to the Environmental Protection Agency's most recent river and stream assessment, more than half—55 percent—of our rivers are in poor condition and do not support healthy populations of aquatic species.<sup>30</sup>

### LAKES

In the United States, lakes and reservoirs cover nearly 40 million acres.<sup>31</sup> These freshwater bodies provide a great deal of our drinking water and supply water for industry, irrigation and hydropower. Lakes support important food webs and are habitats for numerous threatened or endangered species. Lakes are also the foundation of the nation's \$19 billion freshwater fishing industry; they support numerous tourism industries and provide countless recreational opportunities.<sup>32</sup>

The largest of the lake ecosystems is the Great Lakes Basin, the largest freshwater body in the world. This system contains 90 percent of the United States' supply of fresh water, providing drinking water for more than 40 million Americans and Canadians.<sup>33</sup> The basin supports more than 3,500 plant and animal species<sup>34</sup> and provides critical breeding, feeding and resting habitat for millions of waterfowl, wading birds and many other migratory birds.<sup>35</sup>

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. 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 invasive species
- Acidification from mining operations and the effects from acid rain
- Contamination from toxic chemicals such as mercury, polychlorinated biphenyls (PCBs) and pesticides

### POTENTIAL ENVIRONMENTAL IMPACTS OF RECREATIONAL BOATING AND MARINA OPERATIONS

Boating goes hand-in-hand with wildlife-watching, swimming, fishing, snorkeling and diving—and each of these experiences is enhanced by the clean water needed for a healthy ocean.

Unfortunately, mishandling a boat can harm ecosystems, wildlife and water quality. Improper handling, irresponsible

or neglectful vessel maintenance, and poor refueling, repair and storage habits all present environmental risks. Reducing these risks not only helps preserve clean water and protect the animals that live in it, but also keeps boaters and their families safe—and could even save money.

While marinas are vital to the boating industry and the economy, the very nature of their business makes them a potential source for some of the most damaging types of water pollution. Fortunately, marina owners are in a unique position to stop trash and other pollution from entering the water.

Ocean Conservancy's Good Mate manual fully outlines best boating practices— practical steps you can use today. The manual breaks them down into six manageable chapters: the first five examine pollutants that can enter our waters through regular marina activities and the sixth addresses environmental hazards while at sea. All sections provide boaters and marina operators with many informative and useful tips to be leaders in water protection.

It's time to look beyond the bow and realize you can make a tremendous difference in the quality of your experience on the water and in the health of the water we love so much.



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## OIL AND FUEL



2





### WHAT IT IS AND WHERE IT COMES FROM

Fuel and oil spills can severely damage water quality, wildlife and their habitats as well as local economies.

**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 typically comes from dirty ballast water, oil tank washings, bilge water, slops, sludges, fuel residues and waste oil.

Refueling is how most fuel oil enters the water, but oil can also escape during vessel operations. 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 simultaneously, which allows raw fuel to escape through the exhaust port. According to an Environmental Protection Agency 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.

In an effort to reduce emissions and improve water and air quality, the agency instituted a new rule in 1996 that required engine manufacturers to replace carbureted

two-stroke outboards with cleaner technology by 2006 (40 CFR 91.104). According to the regulation, new engines must reduce hydrocarbon emissions by 75 percent from 1996 levels. Boaters were not required to modify their engines to meet the requirement.<sup>36</sup>

Discharged petroleum hydrocarbons can infiltrate the entire water column, settling onto the bottom of a body of water and the sediments, concentrating at the surface or remaining 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

 All petroleum products can be toxic to organisms in the water. They lower the water's oxygen levels and generally degrade water quality. Both fuel and oil contain toxic hydrocarbons and heavy metals that can be deadly in even very small quantities. Refined products such as motor oil and gasoline are more toxic than crude oils because they are water-soluble. 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, common types of spills. Yet every year Americans spill, throw away or dump out more than 30 times the oil that 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) that fouls the water's surface and severely damages important aquatic organisms.

Many boaters have used dishwashing soaps to break up the sheens or spills around their vessels, believing that dispersing the oil is helpful. **DO NOT** use soaps to disperse a spill—it is **ILLEGAL** (see sidebar). 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 can remain for years. Using soaps also prevents oil or fuel evaporation that would occur naturally in an untreated spill. Petroleum also blocks vital sunlight from reaching plants and photosynthetic plankton, and disrupts the exchange of oxygen at the surface that organisms need to breathe.

Studies show that sustained, low-level concentrations of petroleum in estuaries have long-lasting harmful effects on benthic (bottom-dwelling) organisms. In addition, research indicates that fish and shellfish larvae 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.

Coral reefs are sensitive underwater zones affected by oil and fuel pollution. Reefs are home to thousands of marine organism species, including many commercially important fish and shellfish. During an oil spill, coral cannot flee the contamination. And, although they can move, coral reef fish are often site-dependent and will refuse to leave their territory even if it is toxic.

### IMPACTS ON SPECIES

#### Fish

 The damaging effects of oil on fish depend on their life cycle. Adult fish usually leave contaminated areas, but immobile fish eggs are vulnerable. Fish that hatch from oiled eggs exhibit many developmental problems, including malformed jaws, reduced heart rates and nerve damage. Mature fish exposed to oil can experience fin erosion, skin sores and liver damage. Oil contamination can also negatively affect fish growth rates and reproductive capability.

**DO NOT  
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TO DISPERSE  
A SPILL—IT IS  
ILLEGAL**

## A WORD ABOUT DISPERSANTS

Dispersants are specially designed oil spill products composed of detergent-like surfactants (chemicals that 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.

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. Dispersant effectiveness is dependent upon the type of oil and environmental conditions.

While dispersants typically have low toxicity, they can still have severe and long-term effects on bottom-dwelling organisms.

**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 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 express permission of the U.S. Coast Guard Captain of the Port.



### Birds

 Birds have natural oils that make their feathers waterproof, which helps them regulate their body temperatures by trapping warm air next to the skin. Exposure to petroleum strips away the feathers' insulating properties, leaving the birds susceptible to hypothermia. It also renders them unable to fly or swim. Seabirds consume saltwater during preening, feeding and drinking and use a special gland to extract the salt. Oil can clog this gland and create a life-threatening situation for the bird. Ingesting oil causes internal lesions and coats the bird's digestive tract lining, preventing food absorption.

While birds can survive exposure to small amounts of oil, even very low chronic exposure can make the birds more susceptible to extreme environmental conditions than uncontaminated birds.

### Other Wildlife

 Unlike fish, which can avoid some oil slicks by swimming under them, mammals and sea turtles must surface through the slick to breathe. As a result, they can be coated and recoated in oil many times before leaving the contaminated area. This direct physical contact with oil can cause blindness and clog breathing passages.

Sea otters rely on thick fur coats for temperature regulation, and their fur must be clean and oil-free to insulate properly. Oiled fur also becomes heavy, making swimming difficult, and can cause the animals to drown.

As with birds, marine mammals that ingest oil can experience lesions on the liver and kidneys and stomach bleeding. Inhaling petroleum vapors can also lead to secondary infections such as pneumonia and brain lesions.

### IMPACTS ON THE ECONOMY

 The economic impacts of oil spills are difficult to tabulate, but it is easy to imagine the effects that oil- and fuel-polluted waters would have on tourism. Coastal areas, inland lakes and rivers attract tourists who come to experience the beauty of nature and enjoy recreational water activities. Petroleum fumes, tar balls, oily water and dead oiled wildlife on the water and shoreline can ruin a highly anticipated visit. Oil and fuel pollution can negatively impact all local businesses that rely on boating and recreating visitors, including hotels, restaurants, chartered fishing boats and scuba/snorkeling trips.

Environmental damage from spilled oil and fuel not only affects tourism, it also contributes to property damage and loss as well. Coastal wetlands, sea grasses, shoreline plants and reefs protect inland areas from strong winds, storm surges and erosion. When compromised by pollution, these coastal buffers become ineffective, and inland properties will sustain more wind damage, flood damage and erosion problems.

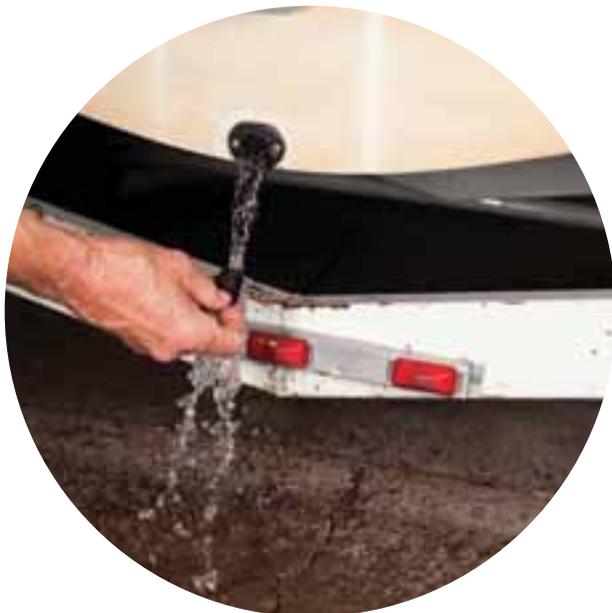
## WHAT YOU CAN DO ABOUT IT

Marinas and individual boaters must play a role in reducing oil and fuel pollution. Most oil pollution results from accidents and/or carelessness. Any operation involving the handling of oil or fuel should be accomplished in a way that minimizes the possibility of accidental release. Incorporating best management practices into daily marina operations and boating activities can help ensure environmentally responsible behavior. The following are some best management practices that boaters and marinas can implement to reduce oil and fuel pollution.

### BEST MANAGEMENT PRACTICES FOR BOATERS

**Take steps to prevent overfilling fuel tanks.** The greatest potential for fuel spills typically happens during fueling of inboard tanks. The U.S. Coast Guard recommends filling inboard fuel tanks to 90 percent capacity to allow for fuel expansion due to heat and help prevent accidental overfilling and spills. Gently covering the air vent with a rag during fueling can also absorb any overflow and help prevent a spill. Boaters should consider purchasing an overflow attachment for the fuel tank air vent. These attachments act as fuel/air separators that release air and vapor while also containing the overflowing fuel.

Since 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 them to set one up. For more information on recycling used oil and filters, see Recycling on page 19.

### BEST MANAGEMENT PRACTICES FOR MARINAS

#### Storage and Spill Prevention

Retail fuel sales constitute a major part of marina business. **Routinely inspect storage tanks—it is both a sound business practice and required by law.** Diesel fuel and gasoline are stored on-site in aboveground or underground storage tanks. Aboveground tanks are preferred because leaks can be detected earlier than in underground tanks. An examination of tank integrity, hose and nozzle condition, and secondary containment equipment should be part of daily inspections. Measuring the current tank level and comparing the number to sales receipts can detect leaks in underground storage tanks.

**Use automatic nozzle shutoffs to reduce the potential for overfilling fuel tanks and stock fuel spill guard attachments for your patrons.** These inexpensive containers attach to the boat hull's external fuel tank air vent while fueling and collect any overflowing fuel from entering the water.

**Focus oil and fuel management strategies 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:

- 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 into the water.
- Safety impact valves should be used on dispensers.
- Marina operators should be present during fueling and must have direct access to emergency shutoff devices.
- Promote the use of automatic/back-pressure/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 treatment when oil absorbent pads become saturated.
- Place containment berms around fixed pieces of machinery that use oil and gas.
- 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 customers should take 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 the dispensing area.

### Recycling

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

**Set up an oil recycling program by collecting used oil and bringing it to a designated collection site** in the area. Many service stations with repair facilities and oil change shops will accept used oil for no charge. Marinas can find local and state collection centers in their area online at <http://recycleoil.org> or by contacting:

American Petroleum Institute  
API Used Motor Oil Program  
1220 L Street  
Washington, D.C. 20005-4070  
(202)682-8000

**Recycle used oil filters.** Used oil filters are made of steel and can be recycled into new steel products, such as cans, cars, appliances and construction materials. Visit [www.filtercouncil.org/regs/index.html](http://www.filtercouncil.org/regs/index.html) or [www.aftermarketsuppliers.org/Councils/Filter-Manufacturers-Council](http://www.aftermarketsuppliers.org/Councils/Filter-Manufacturers-Council) to find your state's recycling regulations and to find a list of filter management companies serving your state, or contact:

Filters Manufacturers Council  
10 Laboratory Drive  
P.O. Box 13966  
Research Triangle Park, NC 27709-3966  
(919)406-8821

**Post tips to help boaters correctly collect their used oil for recycling, including:**

- Drain the oil from the boat's engine into a pan that holds 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.

## Quick Review: Oil and Fuel

Diesel fuel and motor oil are not only toxic to people, plants and wildlife, they can also block life-giving sunlight in the water.

### Boaters

- Refueling is where most spills happen. The U.S. Coast Guard recommends filling the tank only 90 percent to reduce the chance of spills from overfilling.
- Even small oil spills spell trouble for water quality; bilge pumps often can discharge oil directly into the water. Use oil absorbent pads in the bilges of all boats with inboard engines.
- Inspect through-hull fittings often. A sinking boat is not only a safety risk for passengers, but also leaks dangerous fuel, oil and chemicals into the water.

### Marinas

- Routinely inspect storage tanks as required by law.
- Set up an oil recycling program to deliver it to a designated collection site like a service station.
- Make it easy for boat owners to recycle their steel oil filters, which can be made into new products.

- Replace the drain plug and 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 using plastic bottles that were used for bleach, cleaners or other automobile fluids (such as antifreeze). They contain residues that contaminate the oil. Avoid paint cans and other metal containers, or containers used for gasoline.

### Spill Control

Keep 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 contain absorbent material, brooms, shovels, large plastic bags and rubber gloves, all of which can be found at local boating supply stores or in boating catalogs. The equipment should be stored in sealable containers (drums or pails) that serve as waste containers after a spill.

Properly dispose of used oil and fuel-absorbent materials. Before recycling or disposing of any used absorbent materials, contact local authorities for disposal regulations.

## REGULATIONS

A number of federal statutes and state regulations govern the handling, dispensing and storage of fuel, oil and associated hydrocarbon-derived products. Several important 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 marina 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. For more information on these and other laws governing water pollution and other water-related issues, see Appendix C.

### CLEAN WATER ACT

The Clean Water Act, which amended the Federal Water Pollution Control Act of 1972, prohibits the discharge of pollutants, oil, oily waste and hazardous substances into U.S. waters. **The Clean Water Act also prohibits the use of detergents, soaps, surfactants or emulsifying agents to disperse oil spills without the express permission of the USCG.** Violators are subject to civil as well as criminal penalties.

### MARPOL 73/78

Known formally as the International Convention for the Prevention of Pollution from Ships at Sea (MARINE POLLUTION), MARPOL 73/78 is the primary international convention that addresses pollution prevention from ships into the ocean. It contains six annexes, which 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

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 vulnerable to oil pollution. Oil discharges in Special Areas are 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, particularly Annexes I, II, III and V. The Ocean Dumping Act (33 USC 1401, et seq.) and the Refuse Act (33 USC 407) also address discharges, so one law alone cannot comprehensively address the subject. Each of these laws applies to different aspects of the discharge or deposit of substances or material deemed harmful to the marine environment into waters subject to U.S. jurisdiction.

## OIL POLLUTION ACT

Congress passed the Oil Pollution Act of 1990 in direct response to the Exxon Valdez oil spill in 1989. 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 costs and associated environmental damage. In addition, civil penalties of several thousand dollars can be imposed against an individual for failing to report a spill.

## RESOURCE CONSERVATION AND RECOVERY ACT

Congress passed the Resource Conservation and Recovery Act 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 a local solid waste or environmental agency for fuel handling and for a list of used oil drop-off sites.



## RESOURCES AND CONTACTS

### TO REPORT AN OIL SPILL OR HAZARDOUS SUBSTANCE RELEASE

Call the National Response Center immediately at (800)424-8802. See Appendix A for more details.

### FOR MORE INFORMATION ON OIL, FUEL AND HAZARDOUS WASTE DISPOSAL

Call your local department of environmental management with questions about the proper disposal of oil, household chemicals or other hazardous waste.

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

**Environmental Protection Agency Oil Spill Program**  
[www.epa.gov/oilspill](http://www.epa.gov/oilspill)

**Ocean Conservancy**  
[www.oceanconservancy.org/do-your-part/green-boating/](http://www.oceanconservancy.org/do-your-part/green-boating/)

**U.S. Coast Guard**  
[www.uscg.mil](http://www.uscg.mil)  
[www.homeport.uscg.mil](http://www.homeport.uscg.mil)

**U.S. Coast Guard Auxiliary**  
[www.cgaux.org](http://www.cgaux.org)

**U.S. Power Squadron**  
[www.upsp.org](http://www.upsp.org)

## REFERENCES

36. Oregon State Marine Board. "Outboard Motors & Pollution: Information to Clear the Air" online brochure, <http://www.oregon.gov/osmb/library/docs/epa-outboards.pdf> (No date) Accessed August 6, 2013



# SEWAGE POLLUTION



3





### WHAT IT IS AND WHERE IT COMES FROM

Sewage is human body and toilet waste. It is also known as “black water” (in contrast, “gray water” is galley, bath and shower water). Untreated sewage can enter the water from faulty residential, municipal or marina septic treatment systems or from 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 intentional dumping. Sewage pollution degrades water quality by introducing microbial pathogens into the environment. It also increases biological oxygen demand, an important water quality measure that refers to the amount of oxygen available in the water for organisms to use. The higher the demand, the less oxygen there is in the water for animals to survive. Biological oxygen demand increases in areas with many boats and little water movement.

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

A single overboard discharge of human waste in shallow enclosed areas like a bay can be detected across 1 square mile.<sup>37</sup> 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 AND SAFETY

 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 contaminated

**TABLE 1. TYPES OF MARINE SANITATION DEVICES AND THEIR TREATMENT SYSTEMS**

**TYPE I**

- Treats sewage before discharge by chopping or macerating. May add disinfectant chemicals. Disintegrates solids before discharging into water.
- Only allowed on vessels less than or equal to 65 feet.
- Produces effluent having a fecal coliform bacteria count not greater than 1,000 per 100 milliliters; must not show any visible floating solids.

**TYPE II**

- 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.
- May be installed on vessels of any length.
- Produces effluent having a fecal coliform bacteria count not greater than 200 per 100 milliliters and suspended solids not greater than 150 milligrams per liter.

**TYPE III**

- Does not allow the discharge of sewage. Includes recirculating, incinerating devices and holding tanks.
- Holding tanks are the most common kind of Type III marine sanitation device used on recreational boats. Waste is stored until it can be pumped out at 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 3 nautical miles limit.
- May be installed on vessels of any length.

Sources: Environmental Protection Agency, “Marine Sanitation Devices,” <http://water.epa.gov/polwaste/vwd/vsdmsd.cfm> (July 16, 2012) Accessed July 30, 2013. U.S. Coast Guard, “Marine Sanitation Device: Vessel Requirements,” [www.uscg.mil/hq/cg5/cg5213/msd.asp](http://www.uscg.mil/hq/cg5/cg5213/msd.asp) (April 13, 2013) Accessed July 30, 2013.

shellfish. Pathogenic contaminants—such as streptococci, fecal coliform and other bacteria—may cause diarrhea, bacillary dysentery, acute gastroenteritis and skin rashes. The most common pathogen found in sewage pollution is a coliform bacterium (found in the intestines of all warm-blooded animals).<sup>38</sup> Children, the elderly 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, officials may close swimming beaches and shellfish beds. Shellfish beds must close when a fecal coliform bacterial count reaches 14 counts per 100 milliliters of water. A count of 200 fecal coliform bacteria per 100 milliliters of water warrants closures of beaches to swimming and other primary recreation.

Although few studies directly link the discharge of boat sewage to disease incidence, studies conducted in Puget Sound, Long Island Sound, Narragansett Bay, Chesapeake

Bay and the Florida Keys 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 of nutrients are necessary for the healthy development of a natural ecosystem, but when excessive nutrients are introduced into an ecosystem, they can disrupt its natural cycles.

Algae are single-celled organisms that are the base 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,

decomposition depletes the dissolved oxygen in the water, increasing the amount of bacteria. This process, called eutrophication, increases an ecosystem's biological oxygen demand and leads to foul odors and fish kills.

Sewage holding tanks on boats can also contain tank disinfectants, deodorants or other chemicals that can be toxic to the marine environment. Holding tanks may contain high concentrations of toxic hydrogen sulfide. If these toxic chemicals enter the water, they can accumulate in the bottom sediment, where they contaminate bottom-dwelling organisms. Over time, these toxins work their way up through the food chain (a process known as bioaccumulation), eventually reaching people who eat contaminated fish or shellfish.

### IMPACTS ON THE ECONOMY

 Sewage makes water look bad and smell even worse. Murky water, surface films and scum, odors and sewage-related floatable debris diminish the aesthetics of waterways. Because most marinas have limited flushing capacity, sewage can linger in marina waters, making boating—and even being near the water—very unpleasant.

Sewage pollution can hurt a community's economy by impacting tourism and waterfront development. Medical care and cleanup costs also become a factor when sewage compromises human health and safety. In addition, businesses lose revenue when shellfish beds and fishing area closures suspend commercial and recreational fishing activities.

### WHAT YOU CAN DO ABOUT IT

Marinas and individual boaters must play a role in reducing sewage pollution. Incorporating best management practices into daily marina operations and boating activities can help ensure environmentally responsible behavior. The following are some best management practices that boaters and marinas can implement to reduce sewage pollution.

### BEST MANAGEMENT PRACTICES FOR BOATERS

#### Marine Sanitation Devices

It is illegal for vessels to discharge raw sewage within 3 nautical miles of the U.S. coastline and the Great Lakes.

While the United States does not require recreational boats to have toilets, **installed toilets that are not equipped with a marine sanitation device 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, preferably a Type III holding tank. (See Table 1 for more information.)

#### Close any direct flow-through sewage system while navigating within 3 nautical miles of the U.S. coastline.

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.

It should be noted that the regulations regarding installation and use of Type III devices have caused great frustration in the boating community. Many 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 pump-out facilities in some states.

Boaters can have a tremendous impact on controlling sewage pollution by:

- Installing and properly using a Type III holding tank to keep raw sewage and chemicals out of the water.



**FOR DIRECT DISCHARGE OF SEWAGE, SOME BOATS ARE EQUIPPED WITH A Y-VALVE, WHICH CAN ONLY BE USED BEYOND 3 NAUTICAL MILES OF THE U.S. COASTLINE. U.S. 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.**

- Learning how a marine sanitation device 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 pump-out facilities when available and asking for them if they are not.
- Encouraging the development of more pump-out stations as well as portable toilet dump stations and learning how to use them.

**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 marine sanitation device must be secured in some way to prevent discharge. Upon meeting certain conditions, a state can designate environmentally sensitive waters within state waters (generally within 3 nautical miles) as no-discharge zones. All completely enclosed lakes are considered no-discharge zones.

## Quick Review: Sewage Pollution

**Think one boat doesn't make a difference? A single overboard discharge of human waste in a shallow enclosed area like a bay can be detected across one square mile.<sup>39</sup> Excess nutrients disrupt natural cycles and pose a human health hazard.**

### Boaters

- **Install and use a marine sanitation device as required by law.**
- **Sewage and chemicals from holding tanks readily contaminate water; patronize marinas that offer pump-out services.**
- **Bring portable toilets ashore for proper disposal.**

### Marinas

- **Boaters want pump-out service; provide portable or stationary units or pump-out boats—or provide information on nearby facilities.**
- **Give boaters access to dumping stations for disposal of portable toilet waste.**
- **Provide clean onshore restrooms and encourage their use.**

Boaters can find out if there are any no-discharge zones in their area by visiting <http://water.epa.gov/polwaste/vwd/vsdnozone.cfm> and [http://water.epa.gov/polwaste/vwd/vs\\_nodischarge\\_map.cfm](http://water.epa.gov/polwaste/vwd/vs_nodischarge_map.cfm). Please note that the lists of no-discharge zones are subject to change and should be checked periodically.

## BEST MANAGEMENT PRACTICES FOR MARINAS

- Provide pump-out services (such as portable or stationary units or pump-out 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 waste.
- Provide dump stations for proper disposal of portable toilet waste. It is illegal to dump the contents of portable toilets overboard within 3 nautical miles of the U.S. coast.
- To ensure proper equipment function, inspect and maintain sewage disposal facilities regularly. Monitor equipment for proper use.
- Incorporate language into slip leasing agreements that encourages the use of pump-out 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.
- If you observe any boat not complying with water pollution regulations, report it to the National Response Center at (800)424-8802.

## REGULATIONS

There are multiple federal and state regulations designed to eliminate sewage pollution in U.S. waters. For more information on these and other laws governing water pollution and other water-related issues, see Appendix C.

### CLEAN VESSEL ACT

Passed in 1992, the Clean Vessel Act provided \$40 million to states to construct and maintain pump-out 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 to states to create alternatives to overboard disposal of recreational boater sewage.

## CLEAN WATER ACT

The Clean Water Act, originally known as the Federal Water Pollution Control Act, was designed to “restore and maintain the chemical, physical and biological integrity of the nation’s waters.” The act established a permit system to limit industrial and municipal discharges and to protect wetlands. States were also required to adopt water quality standards with government oversight.

Section 312 of the Clean Water Act (33 USC 1322) required the U.S. Environmental Protection Agency to set standards for marine sanitation devices and charged the U.S. Coast Guard with enforcing these standards.

## FEDERAL WATER POLLUTION PREVENTION AND CONTROL ACT

Congress passed the Federal Water Pollution Prevention and Control Act 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. This legislation also establishes guidelines for device certification and designates proper use enforcement to the USCG.

## MARPOL 73/78

Known formally as the International Convention for the Prevention of Pollution from Ships at Sea (MARINE POLLUTION), MARPOL 73/78 is the primary international convention that addresses pollution prevention from

ships into the ocean. It contains six annexes, which cover the following:

- Annex I . . . . . Oil
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- Annex III . . . . . Hazardous substances carried in packaged form
- Annex IV . . . . . Sewage
- Annex V . . . . . Garbage
- Annex VI . . . . . Air pollution

Annex IV contains requirements to control sewage pollution. As of November 2013, 134 nations have ratified Annex IV.<sup>40</sup> The United States has not ratified Annex IV because existing federal and state regulations 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, particularly Annexes I, II, III and V. The Ocean Dumping Act (33 USC 1401, et seq.) and the Refuse Act (33 USC 407) also address discharges, so one law alone cannot comprehensively address the subject. Each of these laws applies to different aspects of the discharge or deposit of substances or material deemed harmful to the marine environment into waters subject to U.S. jurisdiction.



## RESOURCES AND CONTACTS

### CLEAN VESSEL ACT GRANT PROGRAM

Marinas located on navigable fresh or saltwater bodies that service recreational vessels are eligible to receive funds to improve or install sewage facilities. For more information, contact your local U.S. Fish and Wildlife office or visit the Grants.gov website ([www07.grants.gov/search/basic.do](http://www07.grants.gov/search/basic.do)).

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

#### Ocean Conservancy

[www.oceanconservancy.org/do-your-part/green-boating/](http://www.oceanconservancy.org/do-your-part/green-boating/)

#### U.S. Coast Guard

[www.uscg.mil](http://www.uscg.mil)  
[www.homeport.uscg.mil](http://www.homeport.uscg.mil)

#### U.S. Coast Guard Auxiliary

[www.cgaux.org](http://www.cgaux.org)

#### U.S. Power Squadron

[www.upsp.org](http://www.upsp.org)

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# VESSEL MAINTENANCE AND REPAIR



4





### WHAT IT IS AND WHERE IT COMES FROM

In the Good Mate program, “vessel maintenance” is defined as surface cleaning, washing, waxing and other maintenance (such as regular inspections of through-hull fittings). “Vessel repair” is defined as sanding, grinding, painting, repairing plastic and hull scrubbing. This chapter 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.

Keeping vessels properly maintained and repaired is an important part of being a responsible boater or marina operator. Clean hulls help keep boats safe and efficient. Fouling—the growth of small plants and animals on a boat’s hull—can cause vessels to lose maneuverability and experience lowered fuel economy. Applying anti-fouling agents is a common preventative measure boaters use to keep their vessels shipshape.

Tin compounds (also known as “organotins”) prevent fouling on all types of hulls, but these materials also have serious side effects. Tributyltin (TBT), one of the most highly effective—and environmentally dangerous—anti-fouling agents, was used on hundreds of thousands of recreational vessels before regulatory controls were put in place in 1989.

The Environmental Protection Agency eventually classified these compounds as restricted-use pesticides and their use has been prohibited on non-aluminum hulled vessels less than 25 feet in the United States and other industrialized nations since 1988,<sup>41</sup> when Congress passed the Organotin Anti-fouling Paint Control Act, which restricts the method of application, type of applicator and size of vessel that may use anti-fouling paints containing TBT.

However, TBT paints are still available in some parts of the world. The International Maritime Organization’s International Convention on the Control of Harmful Anti-Fouling Systems on Ships, which prohibits the use of harmful organotins in anti-fouling paints, took effect on Sept. 17, 2008. As of June 2013, 65 signatories—including the United States—have ratified the treaty.<sup>42,43</sup>



**CONCERNED ABOUT THE HIGH LEVELS OF COPPER FOUND IN THE CITY'S MARINA BASINS, THE PORT OF SAN DIEGO TESTED AND EVALUATED THE EFFECTIVENESS OF VARIOUS NON-COPPER BASED ANTI-FOULING PAINTS ON MARINE VESSELS FROM 2008 TO 2010. THE RESULTS OF THIS STUDY WERE PUBLISHED IN A 2011 REPORT, "SAFER ALTERNATIVES TO COPPER ANTI-FOULING PAINTS FOR MARINE VESSELS."**

**IT IS AVAILABLE FOR DOWNLOAD AT:  
<http://bit.ly/17ZnRBY>.**

Using copper-based paints has become a very effective way to prevent the growth of algae, barnacles and other species on boat hulls.<sup>44</sup> Typically, copper (in the form of cuprous oxide) makes up anywhere from 20 to 70 percent of the paint's active ingredients.<sup>45</sup> Copper paint works because it is "contact leaching"—copper leaches out of the semi-porous paint and dissipates metal on the hull, repelling unwanted organisms.

The environmental impact of small quantities of copper leaching from anti-fouling paints is unclear, but research shows that copper in high concentrations is toxic.<sup>46</sup> Due to water quality and environmental concerns, several states are considering various bans on the use of copper-based anti-fouling paints. Washington state has enacted legislation that will ban the use of these paints, effective Jan. 1, 2020.<sup>47</sup> California is considering similar legislation.<sup>48</sup>

In recent years, paint manufacturers have tried to reduce the toxicity of marine paints while preserving anti-fouling and textural benefits. The search for new materials that will both

improve anti-fouling performance and longevity and be kind to the environment has led companies to develop non-copper hull coatings consisting of organic biocides, zinc biocides and non-biocide epoxy and silicone formulations.<sup>49</sup>

However, normal vessel maintenance involves more than just painting the bottom of 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

 Some methods of vessel sanding and cleaning can slough off particulates into the water. These particles can block sunlight from reaching the sea grasses and plants that need it for photosynthesis. Fewer plants and grasses mean less habitat and protection for the many small organisms that depend on the grasses to thrive and grow. Plants also hold sediments in place, so fewer plants means that more sediment can wash away.

Cleaners and detergents may add nutrients (e.g., phosphorus, nitrogen) to local waters. Excess nutrients degrade water quality and promote excess algae growth, which 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 suffocate fish and other species.

### 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. When used on boats, however, those same cleaners go directly into the water without any treatment, which can have lethal effects on marine life.

Cleaning products often contain toxic ingredients such as ammonia, phosphate, chlorine and hydrocarbon byproducts. Pollutants like these that persist and accumulate in the food chain are the most damaging.

When exposed to chemical degreasers, finfish lose the natural oils that facilitate oxygen exchange along their gills, and they may suffocate as a result. Detergents reduce the amount of oxygen in the water, impair gill function in fish and reduce seabirds' ability to stay warm and dry. Metal ions, such as zinc and copper, can attach to fish gill membranes and inhibit oxygen exchange.

The result is reduced appetite, poor swimming performance, slow growth rate and reduced reproductive capability.

Anti-fouling paints leach toxins on a vessel's hull to kill attached organisms. 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 people). Toxins may also accumulate in bottom sediments, where they have the potential to remix with the water during subsequent bottom disturbances, such as channel dredging or storms.<sup>50</sup>

In addition to cleaning and painting activities, marine vessels often use batteries that should be replaced yearly (to ensure proper operation) and pyrotechnics or flares that need to be inspected annually (to insure their availability in an emergency). Because of their toxicity, flares and batteries should be disposed of only in approved containers and locations.

### IMPACTS ON THE ECONOMY

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

### WHAT YOU CAN DO ABOUT IT

Marinas and individual boaters must play a role in reducing the pollution associated with vessel maintenance and repair. Incorporating best management practices into daily marina operations and boating activities can help ensure environmentally responsible behavior. The



**ANY SUBSTANCE THAT IS HAZARDOUS TO YOUR HEALTH CAN BE HAZARDOUS TO MARINE ORGANISMS AND THE ENVIRONMENT. IF A PRODUCT RECOMMENDS THAT USERS WEAR RUBBER GLOVES OR TAKE SPECIAL SAFETY PRECAUTIONS, IT IS HARMFUL TO THE ENVIRONMENT.**

following are some best management practices 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 extend the life of the boat's protective paint coating. Rinsing after each use also reduces the need for cleansers and heavy-duty products.
- Use catch basins or other collection systems at the posted wash areas of your marina. Such systems stop paint resins, chips and other hazardous products from entering the water. If your marina does not have such a system, encourage it to install one.
- Use traditional and less harmful cleaning methods, including baking soda, vinegar, lemon juice, borax and old-fashioned "elbow grease."

When selecting soaps and cleansing products, boaters should:

- Ask marina stores to stock environmentally friendly cleaning products as alternatives to harsh cleansers. Boaters should purchase the least toxic product available to do the job and examine the warning label. If a product is hazardous to humans, it is hazardous to the 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), and make sure you dispose of the rag safely or stow it to clean other spills.

## MARINAS SHOULD POST THESE TIPS (OR PROVIDE THEM AS A FLYER WITH PURCHASES) FOR 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. Do not discard batteries or flares into a dumpster. They are toxic waste!



- 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 toxic paint and varnish particles into the air and water around you. It is important boaters contain these particulates 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, which is 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, collect the scrapings in 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. 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 Environmental Protection Agency, 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 session.
- Dry dock or haul the boat out after each use; this may completely eliminate the need for anti-fouling 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 in 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 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 A1.” The Coast Guard has also approved an alcohol resistant fuel hose: SAEJ1527.<sup>51</sup>
- Regularly inspecting 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 emulsify 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 Boating Safety Equipment

Boaters who do not maintain their equipment not only put themselves at risk, they put others at risk, too. As a result, boaters should ensure that their boat and equipment are properly maintained at all times. 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 backups for new flares (store old and new flares separately) 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.

### BEST MANAGEMENT PRACTICES FOR MARINAS

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

- 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 tarps 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.
- Scrub only hard-finish bottom paints in the water. Scrubbing and using abrasives on boat bottoms while in the water can 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.) Gently sponging soft-painted bottoms will release less paint and lengthen the life of the paint job.



- Pay special attention to traditional teak cleaners, which are caustic. They contain strong chemicals for bleaching the teak. Mild soaps, scrub brushes and water wash-downs 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 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 clearly marked bins for boaters to deposit batteries and unusable flares outdoors and empty the bin regularly.
- Educate boaters on the potential harm cleaners and detergents containing ammonia, bleach, sodium hypochlorites and petroleum distillates can cause.

## REGULATIONS

The primary regulations governing vessel maintenance activities focus on the use and disposal of cleaning materials and associated paint and repair work. For more information on these and other laws governing water pollution and other water-related issues, see Appendix C.

## Quick Review: Vessel Maintenance and Repair

**Sanding, cleaning, painting and degreasing boats can pose major threats to our waters. Particles of dust and paint in the water can block life-giving sunlight, and toxic substances from cleaners and anti-fouling compounds can sicken or kill marine life.**

### Boaters

- Use non-hazardous materials—if it's hazardous to you, it's hazardous to the environment.
- Old batteries can leach dangerous lead or cadmium, and expired marine flares contain toxic materials, too, so dispose of them properly.
- When you paint your hull, choose products that are less dangerous to the environment than others.

### Marinas

- Provide dedicated work areas for basic maintenance. Make sure the floor is impervious, and sweep or vacuum often. Outside, use tarps to catch debris from sanding and scraping.
- Install water catch basins or other collection systems in boat-washing areas.
- Offer environmentally friendly cleaners, and post tips and rules to reduce damage to local waterways.



## CLEAN AIR ACT

Under the Clean Air Act, marinas need to be cognizant of volatile organic compound limits for marine paints. Boaters should use and marinas should stock only marine paints that comply with federal, state and local 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.

## CLEAN WATER ACT

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.

## ORGANOTIN ANTI-FOULING PAINT CONTROL ACT

The 1988 Organotin Anti-fouling Paint Control Act (and local solid waste statutes) governs the disposal of used cleaning materials, empty containers and unused paints.



## 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, [www.ehso.com/EHSO\\_HazWaste.htm](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

Report accidents, spills or suspicious activities to the National Response Center at (800)424-8802

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

#### Ocean Conservancy

[www.oceanconservancy.org/do-your-part/green-boating/](http://www.oceanconservancy.org/do-your-part/green-boating/)

#### U.S. Coast Guard

[www.uscg.mil](http://www.uscg.mil)  
[www.homeport.uscg.mil](http://www.homeport.uscg.mil)

#### U.S. Coast Guard Auxiliary

[www.cgaux.org](http://www.cgaux.org)

#### U.S. Power Squadron

[www.usps.org](http://www.usps.org)

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# MARINE DEBRIS



5



## WHAT IT IS AND WHERE IT COMES FROM

Quite simply, marine debris is trash in the water. Technological advances have led to the creation of very durable products; unfortunately, many of these products fail to decompose—or do so extremely slowly. As a result, plastic and other trash can remain in the environment for hundreds, if not thousands, of years. Cigarette filters, food wrappers, bottles, cans, fishing gear and chemical drums are only a few of the manufactured items trashing the ocean.

Ocean trash is a serious pollution problem that affects the health of people, wildlife and local economies. Trash in the water and on the shore can kill marine wildlife, injure swimmers and beachgoers and ensnare boat propellers.

Much of the debris consists of disposable products that find their way to the water through improper disposal or dumping. Others escape from waste management systems. Much of the trash found in the ocean originated on land. According to the National Marine Debris Monitoring Program, nearly half of the debris found on U.S. beaches came from land-based sources, 19 percent came from ocean-based sources and the remaining 33 percent comes from general sources that could be considered land- or ocean-based.<sup>52</sup>

## IMPACTS

Ocean trash is not confined by geographical boundaries. Winds and currents can carry trash—much of it made of lightweight, buoyant and durable plastic—thousands of miles, impacting people, marine wildlife and the environment along the way.

## IMPACTS ON HUMAN HEALTH AND SAFETY

 Marine debris poses serious threats to human health and safety. Broken glass, metal pieces and other sharp objects in the sand can injure children and other beachgoers. Medical waste that is flushed down sewers and into coastal areas is a serious health hazard. In the water, monofilament line can wrap around a vessel's propeller and possibly stall the boat, leaving the occupants stranded at sea.

## IMPACTS ON THE ENVIRONMENT

 The properties that make plastic so useful on land—like being lightweight, durable and water resistant—make it a serious hazard when it enters the water improperly. Monofilament fishing line, balloon ribbons, ropes and netting can entangle wildlife. Monofilament fishing line is an especially lethal type of debris. Studies indicate that approximately 700 brown pelicans die in Florida from monofilament entanglement each year.<sup>53</sup> Data indicates that monofilament line may



take more than 500 years to break down—if ever.<sup>54</sup> Some animals accidentally eat pieces of plastic, which can have deadly results.

It's 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 animal species, including approximately 43 percent of the world's marine mammals, 44 percent of the world's seabirds and all but one of the seven sea turtle species.<sup>55</sup>

## Impacts on the Economy

 Marine debris can damage boats by wrapping around propellers or clogging water intakes, resulting in immediate and direct economic effects. Increased beach cleaning costs can also deplete a coastal community's finances. The indirect costs may be even greater.

Ocean trash is ugly and dangerous. Its presence discourages people from participating in coastal activities, such as fishing, boating, swimming or beach-going. 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. Trashed beaches do just the opposite.

## WHAT YOU CAN DO ABOUT IT

Ocean trash is an entirely preventable problem, but it must be stopped at the source. Marinas and boaters must play a role in reducing the amount of marine debris that enters the water. Incorporating best management practices into daily marina operations and boating activities can help ensure environmentally responsible behavior. The following are some best management practices that boaters and marinas can implement to reduce ocean trash.

**Do not discharge plastics or other solid debris overboard.** 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 information on the specific regulations, see Regulations on page 43.)

Once back on shore, boaters and marinas should follow the three R's: reduce, reuse and recycle. **Reduce the amount of disposable products you buy or stock.** Pay particular attention to unnecessary packaging. Purchasing items in bulk or in concentrated form can reduce the amount of discarded packaging. Marinas can try to avoid purchasing double-packaged items when ordering maintenance, store or facility supplies. **Reuse materials whenever possible**, either for their original purpose or a new one (e.g., using plastic milk jugs as bailers). **Recycle discarded materials when possible**, and properly dispose of items that cannot be recycled.

### BEST MANAGEMENT PRACTICES FOR BOATERS

Boaters can help stem the tide of marine debris by:

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

- Ensuring no trash is discarded, washed or blown overboard. If an item is blown 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 that are only accessible by boat. For information on the International Coastal Cleanup, visit <http://www.oceanconservancy.org/cleanup>
- Reporting any illegal dumping you witness to the National Response Center at (800)424-8802.
- Reminding others that plastic garbage generated aboard a vessel should be brought ashore for proper disposal.

### BEST MANAGEMENT PRACTICES FOR MARINAS

- Set up recycling bins for staff and customers and ensure that they are clearly labeled. Check with your local department of environmental quality to find out what materials are recycled in your area.
- Provide adequate and convenient trash cans and garbage receptacles for items that cannot be recycled.
- Set up special collection bins for hazardous materials (e.g., batteries, flares and other items containing metal and/or chemical components). Your local solid waste management authority can provide specific regulations.

## REPRODUCE THE FOLLOWING TIPS ON POSTERS OR AS COUNTERTOP DISPLAYS FOR BOATERS AT YOUR MARINA:

- You are the Captain: Do not allow any debris to be thrown overboard. You can be fined for violating the law.
- Bring all trash back for proper onshore disposal after any boating, fishing or beach outing.
- Do not throw cigarette filters overboard. Filters are non-biodegradable, contain toxic chemicals and can remain in the environment for years.
- Purchase reusable products or containers instead of disposable goods.
- 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 cans or other receptacles. DO NOT throw them overboard.
- Educate all passengers on the law as well as on the impacts ocean trash can have on the marine environment.



## Quick Review: Marine Debris

Trash in the water isn't just an eyesore; it damages boats and threatens the wellbeing of marine wildlife. It also undermines tourism and economic activities that create jobs. But there's good news. Litter in the water is entirely preventable.

### Boaters

- Bring your food containers, cigarette butts and other trash back to shore and recycle when possible.
- Let your marina know if it can provide better waste collection facilities.
- Boaters are known for being good stewards and routinely picking up trash. For greater impact, raise awareness and collect data on what's out there by participating in Ocean Conservancy's International Coastal Cleanup ([www.oceanconservancy.org/cleanup](http://www.oceanconservancy.org/cleanup))

### Marinas

- Set up recycling bins for staff and customers, and talk about the dangers of marine debris.
  - Provide special collection bins for hazardous items like batteries and flares to keep them from being discarded in the water.
  - Provide plenty of containers for safely collecting cigarette butts, the number one marine litter item found worldwide during the International Coastal Cleanup.
- Help larger or commercial vessels segregate their waste into recyclable components; this will improve the onboard waste management process and reduce the vessel's waste disposal costs in port.
  - Ensure that your customers know how to reduce and eliminate marine debris.

## REGULATIONS

There are several federal and state regulations designed to control, monitor and enforce the ban on ocean trash. In the United States, the U.S. Coast Guard is the primary enforcement agency, but individuals may also contact local marine patrol units if they see or suspect a violation. For more information on these and other laws governing water pollution and other water-related issues, see Appendix C.

## MARPOL 73/78

Known formally as the International Convention for the Prevention of Pollution from Ships at Sea (MARINE POLLUTION), MARPOL 73/78 is the primary international convention that addresses pollution prevention from ships into the ocean. It contains six annexes, which 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

Annex V prohibits the disposal of all plastics at sea. 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 and commercial. As of January 2013, revisions to Annex V prohibit the discharge of all garbage into the sea, except under special circumstances.<sup>56</sup>

## MARINE PLASTIC POLLUTION RESEARCH AND CONTROL ACT

Congress passed the Marine Plastic Pollution Research and Control Act, which implemented MARPOL's Annex V in U.S. waters. This law specifically prohibits U.S. vessels from throwing or disposing of plastics overboard anywhere in the world and prohibits foreign or domestic vessels from disposing of plastics within U.S. waters. The law also regulates the disposal of non-plastic items depending on a vessel's distance from shore.



The law requires all vessels 26 feet or longer to display a MARPOL placard, which illustrates the distances from shore and the materials that may be thrown overboard. Vessels that are 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 crew about standard refuse practices applicable to the vessel.

## RESOURCES AND CONTACTS

### SOLID WASTE AND RECYCLING INFORMATION

Call your local solid waste operations department if you have questions about the disposal of solid waste, used oil, household chemicals or recycling.

### SIX-PACK RING RECYCLING

Contact the marina, local recycling center or ITW Hi-Cone to recycle plastic six-pack ring holders. ITW Hi-Cone produces six-pack rings and sponsors the Ring Leader Recycling Program. You can bring six-pack rings to a local recycling center or mail them to ITW Hi-Cone—Ring Leader Program, 1140 W. Bryn Mawr Ave., Itasca, IL 60143-9918. Visit [www.ringleader.com](http://www.ringleader.com) for more information.

### TO REPORT POLLUTION

If you observe any boat not complying with water pollution regulations, contact the National Response Center at (800)424-8802.

### SEA PARTNERS CAMPAIGN

Sponsored by the U.S. Coast Guard and U.S. Coast Guard Auxiliary, the Sea Partners Campaign is an education and outreach program designed to raise community awareness of marine debris and pollution issues and provide information on relevant laws and regulations. <http://www.uscg.mil/hq/cg5/cg544/seapartners.asp>

### MARPOL PLACARDS

To obtain a MARPOL placard online, visit the National Oceanic and Atmospheric Administration's Marine Debris website (<http://marinedebris.noaa.gov/outreach/posters.html>)

Visit the following websites for more information on ocean trash and marine debris:

#### International Coastal Cleanup

[www.oceanconservancy.org/cleanup](http://www.oceanconservancy.org/cleanup)

#### Ocean Conservancy—Trash Free Seas

[www.oceanconservancy.org/our-work/marine-debris/](http://www.oceanconservancy.org/our-work/marine-debris/)

#### U.S. Coast Guard

[www.uscg.mil](http://www.uscg.mil)

[www.homeport.uscg.mil](http://www.homeport.uscg.mil)

#### U.S. Coast Guard Auxiliary

[www.cgaux.org](http://www.cgaux.org)

#### U.S. Power Squadron

[www.usps.org](http://www.usps.org)

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# STORMWATER RUNOFF



6





### WHAT IT IS AND WHERE IT COMES FROM

Pollutants enter the water in a variety of ways, but most pollution inputs can be categorized as “point” or “nonpoint” discharges.

Point sources of pollution introduce pollution into the environment at a specific site or “point.” Point sources of pollution are generally the easiest to identify, monitor and regulate. Classic examples include industrial and sewage or municipal outfall pipes. By law, point sources of pollution are required to be registered and regulated by federal, state and local laws.

By contrast, nonpoint source pollution comes from a plethora of diffuse sources and is unconstrained or unchanneled in movement. Nonpoint source pollution is caused by water (typically rainfall or snowmelt) moving over and through the ground. As the runoff moves, it gathers natural and manufactured pollutants and deposits them into lakes, rivers, wetlands, coastal waters

and even our underground drinking water reservoirs.<sup>57</sup> Classic examples include storm drains and runoff from parking lots, roadways or agricultural land.

Nonpoint sources are more difficult to measure, quantify and regulate because they tend to be diffuse and widespread. In fact, nonpoint sources of water pollution are virtually unregulated in the United States, even though they are the leading cause of water quality problems.<sup>58,59</sup>

Stormwater runoff can pick up fertilizers and animal waste from agricultural fields; grass clippings, litter and household chemicals from urban and suburban streets; and oil and other automotive substances from roadways and parking lots. Erosion of upstream land also contributes tons of soil to runoff, which eventually enters coastal waters.

In marinas, principal runoff pollutants come from parking lots and hull maintenance areas. They include toxic metals from boat hull scraping and sanding, other suspended solids, organics (oil and grease), detergents, litter and bilge

waste. Improper debris and sewage disposal, oil and fuel discharges, improper vessel maintenance and stormwater runoff are all potential boating and marina-based nonpoint pollution sources. Boaters and marina operators must always be diligent in preventing even the smallest amounts of pollutants from entering the water.

## IMPACTS

Polluted stormwater runoff can severely harm water quality, wildlife and habitats, ultimately affecting 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

 Runoff from coastal and upstream erosion carries sediment, or particles of minerals and organic matter, into water bodies. When the runoff flow is light, sediments quickly drop to the bottom, with the densest and coarsest materials falling first. During times of heavy water flow, sediment remains suspended in the water. The finest sediments can remain suspended in runoff for a very long time.

Excessive sediment in runoff creates several problems. Suspended sediments can reduce water clarity, interfere with animal respiration and digestion, and block the sunlight that plants require 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. Waterways, channels and marina basins can be filled in by excess sediment, resulting in the need for increased dredging and increases in dredge spoil disposal costs.



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

## IMPACTS ON SPECIES

 Petroleum products like 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 very sensitive to even very low levels of petroleum compounds. Petroleum products also contain toxic metals.

Nutrients, such as phosphorous 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 cycles of an ecosystem.

Algae are single-celled organisms that are the base of most food chains 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, decomposition depletes the dissolved oxygen in the water, increasing the amount of bacteria. This process, called eutrophication, increases an ecosystem's biological oxygen demand and leads to foul odors and fish kills.

Toxic organics and heavy metals from industrial activities, automobile emissions, boat cleaning, pesticide use and illicit sewer connections can pollute stormwater runoff. 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.

Human sewage and animal wastes introduce pathogens, such as bacteria and viruses, into runoff. Contaminants carried in runoff may pose a health risk through direct exposure (swimming and other water-contact activities in contaminated water) and through consumption of contaminated shellfish. Pathogenic contaminants such as streptococci, fecal coliform and other bacteria may cause diarrhea, bacillary dysentery, acute gastroenteritis and skin rashes. Children, the elderly and those with



weakened immune systems may have a more severe reaction to sewage-contaminated water.

The most visible pollutants in stormwater runoff are small pieces of trash, such as cigarette filters, bottle caps and lids. Seabirds and other marine wildlife are known to eat this trash, mistaking it for food. The trash can choke the animal or accumulate in its digestive tract, causing the animal to slowly starve.

## IMPACTS ON THE ECONOMY

 Since 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 tourists who want to vacation in a pristine natural area. This in turn will hurt businesses that rely on tourists, including hotels, restaurants, chartered fishing boats and scuba/snorkeling tours.

Sewage runoff makes water look bad and smell worse. Sewage pollution can hurt a community's economy by decreasing tourism and waterfront development. Medical care and cleanup costs also become a factor when sewage compromises human health and safety. In addition, businesses lose revenue when shellfish bed and fishing area closures suspend commercial and recreational fishing activities.

### WHAT YOU CAN DO ABOUT IT

Marinas and individual boaters must play a role in reducing stormwater runoff pollution. Incorporating best management practices into daily marina operations and boating activities can help ensure environmentally responsible behavior. The following are some best management practices that boaters and marinas can implement to reduce vessel operation damage.



## BEST MANAGEMENT PRACTICES FOR BOATERS

- Select non-toxic 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 petroleum spills. Keep boat and auto motors well-tuned to prevent fuel and lubricant leaks and improve fuel economy.
- Properly dispose of trash, including cigarette filters, in onshore bins. Alert marina staff if bins are overflowing.

## BEST MANAGEMENT PRACTICES FOR MARINAS

### Structural Best Management Practices

Structural best management practices are excellent environmental protection alternatives for marinas and can be especially valuable in areas without 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 best management practices may require a state permit. Seek the advice of your state department of environmental protection or department of natural resources before proceeding.) You may want to consult with a professional marina design engineer with experience designing these types of structures.

### Quick Review: Stormwater Runoff

At marinas, storm drains can carry pollutants, including toxic metals from boat hull scraping and sanding, oil and grease, detergents, litter and hazardous bilge waste, directly into the water.

#### Boaters

- Use non-toxic cleaning products.
- Discard worn motor parts carefully so oil doesn't wash from them into storm drains.
- Dispose of trash properly in onshore bins.

#### Marinas

- Install buffer strips of vegetation or sand to filter storm runoff.
- Maintain storm drains and stencil messages near them to remind boaters about the direct connection to local waters.
- Maintain proper functioning of all marina equipment and inspect sewage disposal facilities regularly.

**Filtration practices** use vegetation or sand near the marina to reduce runoff impact by filtering and settling pollutants. After being filtered, stormwater runoff can be routed into drainage channels, guts or other water bodies. It can also 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, like grassy meadows. The vegetative cover helps with sediment settling and pollutant removal.
- **Grassed swales:** shallow, vegetated ditches where 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 sand beds 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 called sand trenches has been developed specifically to treat parking lot runoff.

**Detention practices** 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 detain 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 best management practices 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 BEST MANAGEMENT PRACTICES

- Ensure all marina equipment functions properly and 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.
- Implement xeriscape: landscape that uses native, drought-tolerant 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.
- Contact the National Response Center at (800)424-8802 if you see any boat not complying with water pollution regulations. You may also contact the local environmental enforcement office for information on local water pollution regulations.

## REGULATIONS

For more information on these and other laws governing water pollution and other water-related issues, see Appendix C.

### CLEAN WATER ACT

In 1972, Congress passed the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act. The Clean Water Act's mission was to "restore and maintain the chemical, physical and biological integrity of the nation's waters." This legislation established a permit system to limit industrial and municipal discharges and to protect wetlands. States were also required to adopt waste quality standards with federal government oversight.

Section 402 (33 USC 1342) of the National Pollutant Discharge Elimination System Program makes it illegal for municipal and industrial facilities to discharge pollutants into navigable waters without an authorized permit. The Environmental Protection Agency or a designated state agency issues permits and discharge reports are made available to the government and public.

Section 319 (33 USC 1329) requires states to assess and develop control programs for nonpoint sources. It authorized the Environmental Protection Agency to approve state management programs to provide implementation grants.

Under section 6217 of the 1990 amendments to the Clean Water Act, the Environmental Protection Agency and the National Oceanic and Atmospheric Administration developed guidance specifying management measures for nonpoint 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 the disposal of solid waste, used oil, household chemicals or questions about recycling.

### XERISCAPING

Contact your local agricultural cooperative extension service to learn more about landscaping your property with native vegetation to conserve water and reduce stormwater pollution. You can also contact the Department of Agriculture's Natural Resources Conservation Service at: [www.nrcs.usda.gov](http://www.nrcs.usda.gov).

### STORM DRAIN STENCILING

For information on how you can stencil storm drains, visit the EPA's storm drain-marking fact sheet at: <http://1.usa.gov/bhpFjk>.

### TO REPORT POLLUTION OR SEWAGE SPILLS

Notify the National Response Center at (800)424-8802 if you observe any boat not complying with water pollution regulations.

### 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:

#### Ocean Conservancy

[www.oceanconservancy.org/do-your-part/green-boating/](http://www.oceanconservancy.org/do-your-part/green-boating/)

#### U.S. Coast Guard

[www.uscg.mil](http://www.uscg.mil)  
[www.homeport.uscg.mil](http://www.homeport.uscg.mil)

#### U.S. Coast Guard Auxiliary

[www.cgaux.org](http://www.cgaux.org)

#### U.S. Power Squadron

[www.usps.org](http://www.usps.org)

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# VESSEL OPERATION DAMAGE



7





### WHAT IT IS AND WHERE IT COMES FROM

Vessel operation damage occurs whenever a boater damages the environment through improper handling, irresponsible use or neglect of a vessel. Improper anchoring, operating in shallow water, running aground in a sensitive area, operating without regard to wildlife, and neglecting or improperly maintaining a vessel to the point where it sinks are all examples of vessel operation damage. The effects can be costly.

All boat owners are responsible for assuring that their boats are seaworthy. An un-seaworthy vessel threatens passenger safety and also poses an environmental hazard. Neglected or unmaintained vessels are at greater risk of sinking and releasing fuel, oil, sewage and toxic chemicals into the water.

An additional problem is the introduction of invasive species. Invasive species are non-native plants or animals that enter a new ecosystem and cause harm or damage to

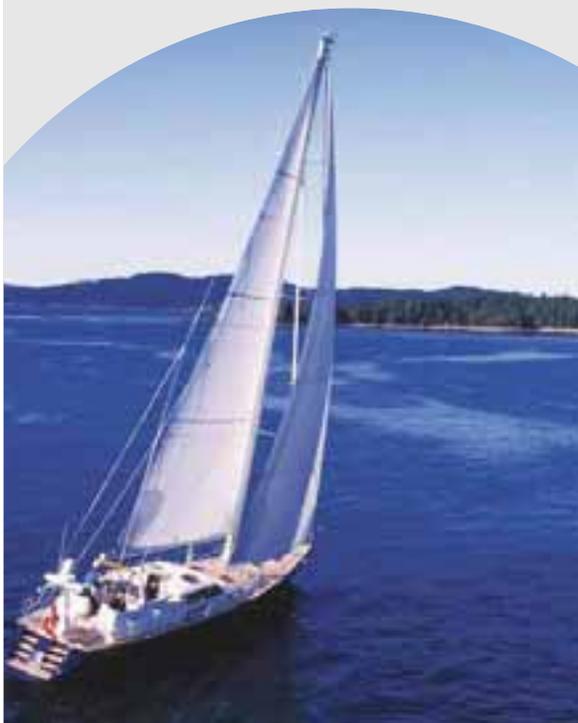
natural resources and the economy. There are many ways that invasive species (also known as aquatic nuisance species) can be introduced into a new environment. Ships can spread invasive species when they discharge ballast water or when species “hitchhike” on traveling vessels. People contribute to the problem when they release unwanted exotic aquarium species or discard unused live bait into the water.

Although some species may not survive such a transition, many actually thrive, since they often lack natural predators in their new environments. As a result, they are often free to reproduce unchecked. Once they are established, it is very difficult to control their proliferation. Invasive species can also prey voraciously on native marine life, permanently altering the ecosystem. The zebra mussel, European ruffe, round goby and lionfish are examples of species that have recently infiltrated U.S. waters.

## KNOW YOUR WATER COLORS

Use these helpful reminders to aid you in avoiding water that is too shallow.

- **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:** Sandbars 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 appropriate marine charts.
- **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.<sup>60</sup>



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## IMPACTS

### IMPACTS ON THE ENVIRONMENT

 A metal anchor and dragging chain set down in a sensitive habitat can gouge and abrade sea 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 thousands of aquatic species.

Navigating a vessel through shallow waters can cause significant environmental damage and pose safety hazards. As boats travel into shallow water, their propellers may cut into sea grass beds, often trenching the bottom, removing all grass blades, rhizomes (underground stems with roots) and even sediment. This is particularly true of personal watercraft that use powerful water jet propulsion systems.

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 combined effect of these scratches and nicks can be quite dramatic. Sea grass will seldom regrow in exposed sandy scars, and damaged coral often invites disease, which further damages the reef.

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 and erode or 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.

### IMPACTS ON SPECIES

 Traveling at high speeds in shallow waters stirs up bottom 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 animals, such as manatees, sea otters and sea turtles.

Besides the risk of physical injury, there are also risks associated with encounters between boaters and animals. Disturbing animals forces them to flee the area, possibly interrupting feeding or sleeping and causing them to expend valuable energy. Any activity that forces a protected or endangered animal to change its behavior is considered harassment and is illegal (see Chapter 7 Regulations or Appendix C for more information). Protected species in the United States include migratory waterfowl (ducks, geese, swans, egrets, herons), river otters, beavers, whales and dolphins, seals and sea lions, sea turtles, sea otters and manatees.

## IMPACTS ON THE ECONOMY

 Operating a boat in shallow water can be costly. 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 invasive species influx can have significant economic impacts. By altering the environment, invasive species can deplete populations of commercially valuable native species. The U.S. Fish and Wildlife Service estimates that the zebra mussel—an invasive species known for clogging intake pipes for drinking water, power generation and industrial facilities—cost the Great Lakes region about \$5 billion in removal and nuisance control measures from 2000-2010.<sup>61</sup>

### WHAT YOU CAN DO ABOUT IT

Marinas and individual boaters must play a role in reducing vessel operation damage. Incorporating best management practices into daily marina operations and boating activities can help ensure environmentally responsible behavior. The following are some best management practices that boaters and marinas can implement to reduce vessel operation damage.

## BEST MANAGEMENT PRACTICES FOR BOATERS

### Become Better Educated

As a boat owner and operator, you have a responsibility to yourself, your passengers and the 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 vessel operation, navigation, proper emergency procedures, safety equipment, pollution control and proper vessel maintenance.

Avoiding the shallows is one easy way to protect you, sensitive bottom habitats and sea grass ecosystems. Since these shallow, sensitive habitats may grow within inches of the water's surface (whether inland or offshore), avoiding them can be tricky. Fortunately, the color of the water can give you a good indication of what is below the surface (on page 56).

If you should run aground, DO NOT try to motor your way out! 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 know the restrictions on interacting with wildlife and that they follow proper wildlife interaction procedures when dealing with marine mammals and sea turtles.

As a rule, boaters should always slow their boat when approaching wildlife. Maintaining a safe distance of 100 yards from marine wildlife is generally the rule (500 yards is required for the highly endangered northern right whale). However, you should always check state and local regulations.

It is illegal under federal law to feed, harass, molest or injure marine 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.

### Invasive Species

Worldwide, most invasive species enter waterways through 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 these 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 the engine cooling system, live wells, bilge and bait buckets with very hot water if possible. If hot water is not available, use fresh 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 fresh 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 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 invasive species, like the zebra mussel, can live for at least 48 hours out of water.
- DO NOT dump unused bait or its packaging material into the water. While bait may be bought locally, it is often shipped in from farther away.

### Maintain a Seaworthy Vessel

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. As a result, you should:

## Quick Review: Vessel Operation

### Boaters

- **Anchors aweigh: Choose anchor sites carefully and use proper techniques to avoid damaging sensitive habitat.**
- **Avoid boating in shallow water, where you can stir up sediments and disturb underwater habitat—not to mention damage your propeller, hull and engine if you run aground.**
- **Know where to go slow to prevent shore-damaging wakes.**

### Marinas

- **Maintain up-to-date charts.**
- **Alert boaters to sensitive habitats in your area, protected species they may encounter and the potential dangers of invasive species.**
- **Conduct visual inspections of all vessels in your marina to identify those posing pollution threats.**

- 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.
- Always conduct a visual inspection of your boat after a particularly hard rain. Accumulated rain in the bilge can quickly overburden a bilge pump system and cause the vessel to sink.

## BEST MANAGEMENT PRACTICES FOR MARINAS

Marinas should maintain current charts; alert boaters to sensitive habitats in the area, protected species they may encounter and safe-distance requirements; and inform them of the potential dangers of invasive species. Marina operators should also conduct a visual inspection of all vessels in their marina to spot any that appear to be neglected or pose a threat of sinking or polluting the surrounding waters.

## REGULATIONS

For more information on these and other laws governing water pollution and other water-related issues, see Appendix C.

## 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>.

## MARINE MAMMAL PROTECTION ACT

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



## RESOURCES AND CONTACTS

### USCG Recreational Boating Information

[www.uscgboating.org/](http://www.uscgboating.org/)

### U.S. Coast Guard Auxiliary

[www.cgaux.org](http://www.cgaux.org)

### U.S. Power Squadron

[www.usps.org](http://www.usps.org)

### National Oceanic and Atmospheric Administration Navigational Charts

[www.nauticalcharts.noaa.gov/staff/chartspubs.html](http://www.nauticalcharts.noaa.gov/staff/chartspubs.html)

### National Association of State Boating Law Administrators

[www.nasbla.org](http://www.nasbla.org)

### Boating Safety Resource Center

[www.uscgboating.org/safety/default.aspx](http://www.uscgboating.org/safety/default.aspx)

### Local Boating Guides

Available through your local marina or bookshop.

### Aquatic Nuisance Species Task Force

[www.anstaskforce.gov](http://www.anstaskforce.gov)

### National Invasive Species Council

[www.invasivespecies.gov](http://www.invasivespecies.gov)

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

### Ocean Conservancy

[www.oceanconservancy.org/do-your-part/green-boating/](http://www.oceanconservancy.org/do-your-part/green-boating/)

### U.S. Coast Guard

[www.uscg.mil](http://www.uscg.mil)

[www.homeport.uscg.mil](http://www.homeport.uscg.mil)

## REFERENCES

60. Originally sourced to Florida Keys National Marine Sanctuary, date unknown.

61. U.S. Geological Survey, "Zebra Mussels Cause Economic and Ecological Problems in the Great Lakes" [http://www.glsr.usgs.gov/\\_files/factsheets/2000-6%20Zebra%20Mussels.pdf](http://www.glsr.usgs.gov/_files/factsheets/2000-6%20Zebra%20Mussels.pdf) (July 2011) Accessed August 2, 2013



# APPENDIX



**A-B-C**



## APPENDIX A: NATIONAL RESPONSE CENTER

The National Response Center (NRC) is the single point of contact for reporting oil and chemical spills. U.S. Coast Guard personnel maintain the NRC telephone watch 24 hours per day, 365 days per year. NRC watch-standers enter pollution incident reports into the Incident Reporting Information System and immediately relay each report to the pre-designated Federal On-Scene Coordinators.

If you have a spill to report, call the NRC toll-free at (800)424-8802 or (202)267-2675, or submit an online incident report via the NRC website at [www.uscg.mil](http://www.uscg.mil).

The following is an abbreviated version of the information available on the NRC website. Additional information on reporting requirements and procedures are also housed on the site.

### REPORTING AN INCIDENT

When any of the following incidents occur, the responsible party should immediately contact the NRC 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. Once contacted, the NRC Duty Officer will guide the caller through a series of questions based on the Standard Report Form to gather as much information as possible concerning the spill or release.

#### 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 that requires treatment beyond first aid
- Damage to the vessel and other property exceeding \$500
- Complete loss of the vessel

**Boat operators are required to report their accidents to the authorities in the states where the accident occurred.** Should you witness an accident, report it as soon as possible to the nearest authority to ensure 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 NRC 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 deep-water port
- From a vessel transporting oil from the Outer Continental Shelf

#### Chemical Releases

The Comprehensive Environmental Response, Compensation and Liability Act requires that all releases of hazardous substances exceeding reportable quantities be reported by the responsible party to the NRC.

#### Transportation Accidents

The carrier must report transportation accidents involving hazardous materials, including radioactive substances, immediately to the NRC when, as a direct result of the materials:

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

Even if you don't have all of the above information, you should still call the NRC. You might be providing the first indication that a major incident has occurred.

## NRC RESPONSIBILITIES

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 [§300.125(a)], also known as the National Contingency Plan.

The data collected by the NRC is made available to the general public under the Freedom of Information Act and can now be queried online via the website ([www.nrc.uscg.mil](http://www.nrc.uscg.mil)).

Detailed data searches can be filed at a nominal charge by mailing your request to:

National Response Center  
c/o United States Coast Guard  
2100 2nd Street, SW  
Washington, D.C. 20593-0001  
ATTN: FOIA

## RESOURCES

**National Response Center**  
[www.nrc.uscg.mil](http://www.nrc.uscg.mil)

**40 CFR 300—National Oil and Hazardous  
Substances Pollution Contingency Plan**  
<http://1.usa.gov/14yWekB>

## APPENDIX B: 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 the first outing. This will ensure a fun and safe boating season. The following is the minimum equipment to be inspected for most boats.

- Personal Flotation Devices—USCG approved, in good and serviceable condition; one wearable of the appropriate size for each person on board, 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) U.S. Coast Guard approved, not expired and in good and serviceable condition; in sufficient number; and stowed in a readily accessible manner. 2) Non-pyrotechnic devices (day flag, night auto SOS lantern) U.S. Coast Guard certified, in good and serviceable condition; with batteries in good charge (lantern); and stowed in a readily accessible manner.
- Fire Extinguishers—U.S. Coast Guard 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). Recommended 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 be free of damage. If fitted re-breather hoses are connected, device should be free of dirt and oil buildup for more efficient engine operation.
- Sound Producing Devices and Bells—If required, ensure 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 six seconds in duration. It is recommended to have at least one backup device, such as a police whistle. For a bell, if required, ensure clapper is attached to bell and the bell emits a clear, bell-like tone.
- Navigation Light—Check all lights to ensure they burn bright and clear, are free of obstruction, lenses are of the appropriate color (red for portside and green for 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.
- USCG Auxiliary Vessel Safety Check—To ensure 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. These requirements parallel federal and state requirements with regard to equipment and vessel condition. If the vessel meets or exceeds the requirements, the examiner will award the owner or operator a Vessel Safety Check decal. The Vessel Safety Check 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.

## APPENDIX C: LAWS AND AGREEMENTS GOVERNING WATER POLLUTION

The following is a list of major laws or agreements governing the disposal of wastes into U.S. waters and other water-related issues. The particular relevance of some of these laws to recreational boating is addressed in previous chapters, but boaters and marina staff should be aware of how these laws affect or regulate boating operations and where to find more information.

### CLEAN AIR ACT (CAA)

The CAA regulates air emissions from area, stationary and mobile sources. The law authorizes the U.S. Environmental Protection Agency to establish national Ambient Air Quality Standards to protect public health and the environment. For more information, visit [www.epa.gov/air/caa/](http://www.epa.gov/air/caa/).

### CLEAN VESSEL ACT (CVA)

The CVA was designed to reduce pollution from vessel sewage discharge. The act established a federal grant program to fund the construction, renovation, operation and maintenance of pump-out facilities at local marinas. For more information, visit [www.fws.gov/laws/lawsdigest/clenves.html](http://www.fws.gov/laws/lawsdigest/clenves.html).

### CLEAN WATER ACT (CWA)

The CWA was a significant expansion of the Federal Water Pollution Control Act (FWPCA). CWA focuses on the use, discharge and disposal of sewage, oil and hazardous substances (including dispersants). For more information, visit <http://www2.epa.gov/laws-regulations/summary-clean-water-act>.

### COASTAL ZONE MANAGEMENT ACT (CZMA)

The CZMA 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 more information, visit [http://coastalmanagement.noaa.gov/czm/czm\\_act.html](http://coastalmanagement.noaa.gov/czm/czm_act.html), [www.epa.gov/agriculture/lzma.html](http://www.epa.gov/agriculture/lzma.html) and [www.boem.gov/Environmental-Stewardship/Environmental-Assessment/CZMA/index.aspx](http://www.boem.gov/Environmental-Stewardship/Environmental-Assessment/CZMA/index.aspx).

### ENDANGERED SPECIES ACT (ESA)

The ESA provides a program for the conservation of threatened and endangered plants, animals and the habitats in which they are found. For more information, visit [www.fws.gov/endangered/laws-policies/](http://www.fws.gov/endangered/laws-policies/), [www.fws.gov/endangered/laws-policies/esa.html](http://www.fws.gov/endangered/laws-policies/esa.html) and [www.nmfs.noaa.gov/pr/laws/esa/](http://www.nmfs.noaa.gov/pr/laws/esa/).

### FEDERAL WATER POLLUTION CONTROL ACT (FWPCA)

Now known primarily as the Clean Water Act, the FWPCA was the first major U.S. law to address water pollution. It established goals and policies for the restoration and maintenance of the chemical, physical and biological integrity of U.S. waters. For more information, visit [www.fws.gov/laws/lawsdigest/fwatrpo.html](http://www.fws.gov/laws/lawsdigest/fwatrpo.html).

### MARINE MAMMAL PROTECTION ACT (MMPA)

The MMPA establishes a moratorium on taking and importing marine mammals, their parts and products. The act provides protection for a variety of marine wildlife species including polar bears, sea otters, walrus, dugongs, manatees, whales, porpoises, seals and sea lions. For more information, visit [www.nmfs.noaa.gov/pr/laws/mmpa/](http://www.nmfs.noaa.gov/pr/laws/mmpa/).

### MARPOL 73/78

Known formally as the International Convention for the Prevention of Pollution from Ships at Sea (MARINE POLLUTION), MARPOL 73/78 is the primary international convention that addresses pollution prevention from ships into the ocean. Originally signed and drafted in 1973 by a number of seafaring countries through the International Maritime Organization (IMO), MARPOL was updated in 1978 to include five annexes on ocean dumping, with an annex on air pollution by ships added in 1997. Current 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

When a country ratifies MARPOL 73/78, it automatically adopts Annexes I and II; the remaining annexes are optional. The United States has ratified optional Annexes III and V. For more information, visit [www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-\(MARPOL\).aspx](http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx).

### MARINE PLASTIC POLLUTION RESEARCH AND CONTROL ACT (MPPRCA) (1987)

The MPPRCA, which amended the Act to Prevent Pollution from Ships (APPS), implements Annex V of MARPOL 73/78, restricting the overboard discharge of plastic and other garbage. For more information, visit [www.csc.noaa.gov/legislativeatlas/lawDetails.jsp?lawID=730](http://www.csc.noaa.gov/legislativeatlas/lawDetails.jsp?lawID=730)

### NATIONAL MARINE SANCTUARIES ACT (NMSA)

The NMSA protects special marine resources, including coral reefs, sunken historical vessels or unique habitats, while facilitating any and all “compatible” public and private uses of said resources. For more information, visit <http://sanctuaries.noaa.gov/about/legislation/welcome.html>.

### OIL POLLUTION ACT (OPA)

OPA (also known as OPA 90) requires reporting and cleanup of all oil and hazardous substance spills. For more information, visit <http://www2.epa.gov/laws-regulations/summary-oil-pollution-act>.

### ORGANOTIN ANTI-FOULING PAINT CONTROL ACT (OAPCA)

The OAPCA regulates the use and application of anti-fouling paint for some marine vessels. For more information, visit [www.fws.gov/laws/lawsdigest/organon.html](http://www.fws.gov/laws/lawsdigest/organon.html).

### PORT AND WATERWAYS SAFETY ACT (PWSA)

The PWSA states that navigation and vessel safety and protection of the marine environment are matters of major national importance. It insures that the handling of dangerous articles and substances on the structures in, on or immediately adjacent to U.S. navigable waterways is conducted in accordance with established standards and requirements. For more information, visit [www.law.cornell.edu/uscode/text/33/1221](http://www.law.cornell.edu/uscode/text/33/1221) and [www.csc.noaa.gov/legislativeatlas/lawDetails.jsp?lawID=841](http://www.csc.noaa.gov/legislativeatlas/lawDetails.jsp?lawID=841).

## RESOURCES CONSERVATION AND RECOVERY ACT (RCRA)

RCRA addresses the issue of how to safely manage and dispose of the large volumes of municipal and industrial waste generated in the United States. For more information, visit <http://www2.epa.gov/laws-regulations/summary-resource-conservation-and-recovery-act>.

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