Clean Boating Lesson Plan

Donna Morrow and Elizabeth Fuller Valentine
February 1999

Maryland Clean Marina Initiative
Maryland Department of Natural Resources
580 Taylor Avenue, E-2
Annapolis, MD 21401
410-260-8770
410-260-8779 fax
www.dnr.state.md.us/boating

Lesson Plan Outline

1. Introduction

2. Petroleum Control
    - Environmental Concerns
    - Laws
    - Pollution Prevention Measures
    - Overheads
    - Handout
    - Additional Resources

3. Vessel Sewage
    - Environmental Concerns
    - Laws
    - Pollution Prevention Measures
    - Overheads
    - Handout
    - Additional Resources

4. Waste Containment and Disposal
    - Environmental Concerns
    - Laws
    - Pollution Prevention Measures
    - Overheads
    - Handout
    - Additional Resources

5. Vessel Cleaning and Maintenance
    - Environmental Concerns
    - Laws
    - Pollution Prevention Measures
    - Overheads
    - Handout
    - Additional Resources

Introduction

This *Clean Boating Lesson Plan* is a product of the Maryland Clean Marina Initiative. The Initiative promotes and celebrates voluntary adoption of measures to reduce pollution from marinas and recreational boating. The Initiative is coordinated by the Maryland Department of Natural Resources in partnership with representatives of the marina industry. There are two main aspects to the Clean Marina Initiative: boater education and an awards program to recognize environmentally-responsible marinas. The first Clean Marina awards will be presented during the 1999 boating season. Boaters are encouraged to look for the Clean Marina logo when selecting a marina.

The boater education component compliments the Clean Marina awards program. The goal is to foster wide-spread adoption of pollution prevention measures by making boaters aware of what they can do to protect natural resources. This *Lesson Plan* introduces recreational boaters to the environmental concerns associated with boating, reviews legal requirements, and enumerates pollution prevention practices.

How to use this Lesson Plan

This lesson plan is designed to be incorporated into Maryland's Basic Boating Course. It may be used by any instructor wishing to educate boaters about general pollution prevention measures, however. The *Lesson Plan* is divided into four sections:

- Petroleum control
- Vessel sewage
- Waste containment and disposal
- Vessel cleaning and maintenance

Each section contains a speaking plan for the instructor, overheads, and a handout (i.e., Clean Boating Tip Sheet). It is the instructor's responsibility to photocopy the overheads onto transparencies and to make copies of the handouts for students.

Students may request individual copies of tip cards, brochures, pumpout information, and other DNR materials by calling 410-260-8770. They can also find clean boating materials on line at www.dnr.state.md.us/boating.

Section Contents
Petroleum Control

Section Plan

Overheads
- Environmental Concerns
- The Law
- Fueling Practices
- Bilge Maintenance and Oil Changes
- Disposal of oil Absorbent Materials
- Emissions Control
- Preventative Equipment
- In Case of a Spill

Handout
- Clean Boating Tip Sheet: Petroleum Control

Additional Resources
- Oil absorbent pad
- Container to capture fuel-vent overflows *(Examples are "No-Spill" and "Gas Guzzler." If you wish to use them, they can be purchased at most marine retailers for approximately $15.)*
- Petroleum control practices brochure

Clean Boating Lesson Plan

Petroleum Control Practices

Time Required: 10 minutes

Objective: Participants will learn why petroleum in the water is harmful, what the law says about oil and fuel spills, and how to prevent petroleum spills.

Content and Activity Plan:

Time	*Activity*
10 minutes	Lecture and follow up questions covering:

Environmental Concerns (overhead 1)

Petroleum in or on the water is harmful and, in some cases, fatal to aquatic life. Benzene, a carcinogen, is in gasoline. Oil contains zinc, sulfur, and phosphorous.

Once petroleum is introduced into the water, it may float at the surface, evaporate into the air, become suspended in the water column or settle to the sea floor. Floating petroleum is particularly noxious because it reduces light penetration and the exchange of oxygen at the water's surface. Floating oil also contaminates the *microlayer*. The microlayer refers to the uppermost portion of the water column. It is home to thousands of species of plants, animals, and microbes. Ninety-nine percent of the Chesapeake Bay's blue crab larvae feed in the microlayer which also serves as a nursery ground for rockfish (Hardy 1991). The abundance of life in the microlayer attracts predators: seabirds from above and fish from below. Pollution in the microlayer, thus, has the potential to poison much of the aquatic food web.

Also worth noting, a single pint of oil released onto the water can cover one acre of water surface area.

The Law (overhead 2)

Because of the harm associated with petroleum, the discharge of oil is absolutely prohibited. The Federal Water Pollution Control Act prohibits the discharge of oil or oily waste into or upon the navigable waters of the United States or the waters of the contiguous zone if such discharge causes a film or sheen upon, or discoloration of, the surface of the water, or causes a sludge or emulsion beneath the surface of the water. Violators are subject to a penalty of $5,000.

The United States Coast Guard must be notified anytime a spill produces a sheen on the water. Call the National Response Center at 1-800-424-8802. Report the location, source, size, color, substance, and time of the spill. Failure to report a spill may result in fines.

The Clean Water Act (33 CFR 153.305) also prohibits the use of soaps or other dispersing agents to dissipate oil on the water or in the bilge without the permission of the Coast Guard (specifically, the Captain of the Port of Baltimore). Soaps, emulsifiers and dispersants cause the petroleum to sink in the water column and mix with sediments where they will remain for years. Also, the soaps themselves are pollutants. You may be fined up to $25,000 per incident for the unauthorized use of soap or other dispersing agents on the water or in the bilge.

Maryland State Law

The discharge of oil is also prohibited by State law. Section 4-410(a) of Maryland Environment Article, *Annotated Code of Maryland*, states that

> Except in case of emergency imperiling life or property, unavoidable accident, collision, or stranding, or as authorized by a permit issued under §9-323 of this article, it is unlawful for any person to discharge or permit the discharge of oil in any manner into or on waters of this State.

All spills must be reported immediately to the Maryland Department of the Environment (MDE): 410-974-3551.

Fueling Practices (overhead 3)

Gas or diesel may be spilled during the act of fueling: as backsplash out the fuel intake or as overflow out the vent fitting. Spills of this sort harm aquatic life, waste money, and can result in stains on the hull and damage to the gel coat and striping. Follow these tips to avoid problems:

- Fill tanks to no more than 90 percent capacity--gas that is drawn from cool storage tanks will expand as it warms up onboard your vessel.
- To determine when the tank is 90 percent full, listen to the filler pipe, use a sounding stick (if possible), and be aware of your tank's volume.
- Rather than filling your tank upon your return to port, wait and fill it just before leaving on your next trip. This practice will reduce spills due to thermal expansion because the fuel will be used before it has a chance to warm up.
- Fill portable tanks ashore where spills are less likely to occur and easier to clean up.
- Use oil absorbent pads to catch all drips.
- Slow down at the beginning and end of fueling.

Bilge Maintenance and Oil Changes (overhead 4)

Note–pass around oil absorbent pad as demonstration

Engine oil tends to accumulate in bilges. If no precautions are taken, the oil is pumped overboard along with the bilge water. Discharging oily water is illegal. To avoid fines and to protect water quality, follow these tips:

- Keep your engine well tuned to minimize the amount of oil that is released. Be sure there are no leaking seals, gaskets or hoses.
- If you change your own oil, purchase a non-spill pump to draw crankcase oils out through the dipstick tube and slip a plastic bag over used oil filters prior to their removal to capture any drips. Hot drain the filter by punching a hole in the dome end and draining for 24 hours. Recycle the collected oil. Recycle the metal canister if practical. If not, dispose in your regular trash.
- Place oil absorbent materials or a bioremediating bilge boom in the bilge.
- Place an oil absorbent pad under the engine.

- Replace oil absorbent materials regularly.
- Look for contractors or marinas that offer a bilge pumpout service.
- Do not treat oily water with detergents. Soaps pollute and make clean up impossible. You may be fined up to $25,000 for using soaps to dissipate oil.

Disposal of Oil Absorbent Materials (overhead 5)

The disposal of used oil absorbent material depends on what type of product it is and how it was used:

- Standard absorbents that are saturated with gasoline may be air dried and reused.
- Standard absorbents saturated with oil or diesel may be wrung out over oil recycling bins (if they are saturated with oil or diesel only!) and reused. Alternatively, they should be double bagged with one plastic bag sealed inside of another and tossed in your regular trash.
- Bioremediating bilge booms may be disposed in your regular trash as long as they are not dripping any liquid. Because the microbes need oxygen to function, do not seal them in plastic bags.

Emissions Control (overhead 6)

Marine engines--especially 2-stroke outboard motors--produce the highest average level of hydrocarbon exhaust emissions after lawn and garden equipment. Hydrocarbon emissions contribute to ground level ozone, a known health risk. Follow these tips to help your engine operate as efficiently as possible:

- Use the gas to oil ratio recommended by the engine manufacturer. Too much oil can foul spark plugs and too little can lead to increased engine wear or even failure.
- Use premium two-cycle engine oil (TC-W3 or TC-W4). Premium oils improve engine performance and reduce pollution because they burn cleaner, contain more detergents, and prevent formation of carbon deposits.
- Use gasoline with the octane level recommended by the engine manufacturer.

Preventative Equipment (overhead 7)

Suggestion–bring samples of the following items to class to use as visual aids.

Products are available commercially which can help you prevent spills and reduce emissions:

- Install a fuel/air separator along your vent line. These devices allow air, but not fuel to escape through a vent opening.
- Attach a safety nozzle to portable gas cans used to fill outboard engines. These nozzles automatically stop the flow of fuel when the receiving tank is full.
- To prevent oily bilge water from being discharged, install a bilge pump switch that leaves an inch or two of water in the bilge. Alternatively, connect a bilge water filter to your vessel's bilge pump. Filters will remove oil, fuel and other petroleum hydrocarbons from the water.
- When it is time to buy a new engine, select a fuel efficient, low emission model.
- Attach a container to the external vent fitting to collect overflow. There are products on the market that may be attached to the hull with suction cups. A rubber seal on the container fits over the fuel vent allowing the overflow to enter the container. Fuel captured in this manner can be added to the next boat to fuel.

In Case of a Spill (overhead 8)

- Stop the flow.
- Contain the spill.
- Call the U.S. Coast Guard National Response Center at (800) 424-8802.
- Call the Maryland Department of the Environment s Emergency Response Division at (410) 974-3551.

Petroleum: Environmental Concerns

- Harmful or fatal to aquatic life
- May float on surface, evaporate or settle to bottom
- At the surface, reduces light and oxygen penetration
- Floating petroleum will contaminate microlayer – a nursery for blue crabs and rockfish. Also a feeding zone for birds and other fish.
- Potential to poison aquatic food web

Petroleum : The Law

- Discharge of oil prohibited (Clean Water Act)
- Spill of oil or oily water causing sheen on the surface must be reported to USCG at 800-424-8802
- Such spills subject to a $5,000 penalty
- Use of soap to disperse spill also prohibited – soap is a pollutant and causes petroleum to sink
- Once in sediments, petroleum will last for years
- $25,000 penalty for using soap to hide petroleum spills
- State law also prohibits discharges – may impose additional fines

PetrOleum: Fueling Practices

- Gas or diesel may spill from the fuel intake or the fuel tank vent
- Know your tank capacity
- Fill to no more than 90% capacity – listen and pay attention as you fuel. Keep an eye on the pump's gauge.
- Fuel expands as it warms up on your vessel
- Fuel at the start of a trip, not the end
- Fill portable tanks ashore
- Use oil absorbent pads to catch drips
- Slow down at the beginning and end of fueling

MARYLAND CLEAN MARINA

Petroleum: Bilge Maintenance and Oil Changes

- Engine oil accumulates in bilge – without precautions, it will be pumped overboard with water
- Discharge of oily water is illegal
- Keep engine well tuned
- Use oil absorbent materials in bilge and engine compartment
- Replace oil absorbers regularly

Petroleum: Disposal of Oil Absorbent Materials

- Depends of type of material and how it was used

- Standard absorbents:
  saturated with gasoline – air dry in a safe location and reuse
  saturated with oil or diesel – wring out over recycling container, double bag in sealed plastic and put in regular trash

- Bioremediating materials:
  OK in regular trash, but do not wrap in plastic

MARYLAND CLEAN MARINA

Petroleum: Emissions Control

- High level of hydrocarbon exhaust from marine engines – particularly 2 stroke outboards and PWCs
- Emissions contribute to ground level ozone – a health risk
- Use oil/gas ratio recommended by engine manufacturer
- Use premium 2 cycle engine oil
- Use gasoline with recommended octane level

Petroleum: Preventative Equipment

- Many products available commercially to prevent spills and reduce emissions
- Air/fuel separator – can be retrofitted in vent lines of many boats
- Safety nozzle for portable gas cans
- Bilge pump switches or filters – preventing oily discharge
- Fuel overflow container – attach to hull, covering fuel vent and capture spills. Use if practical for your vessel
- When you buy a new engine, select fuel efficient, low emission model

Petroleum: In Case of a Spill

- Stop the flow
- Contain the spill
- Call the USCG National Response Center at 800-424-8802
- Call Maryland Department of the Environment's Emergency Response Division at 410-974-3551

Section Contents
Vessel Sewage

Section Plan

Overheads
- Environmental Concerns
- The Law

Handout
- Clean Boating Tip Sheet: Vessel Sewage

Additional Resources
- Maryland pumpout location map
- *What Boaters Need to Know about Proper Sewage Disposal*
- Maryland Department of Natural Resources web site: www.dnr.state.md.us/boating
  The ABYC brochure and a map locating pumpouts throughout Maryland are available here.
- American Boat and Yacht Council brochure "Sewage Holding Tank Systems for Recreational Boats" Call 410-956-1050 for supplies, while they last.

Clean Boating Lesson Plan

Vessel Sewage Control Practices

Time Required: 10 minutes

Objective: Participants will learn why sewage from recreational boats is a problem, gain an understanding of the legal requirements regarding vessel sewage, and learn how to minimize the environmental impacts of vessel sewage.

Content and Activity Plan:

Time	*Activity*
10 minutes	Lecture and follow up questions covering:

Environmental Concerns (overhead 1)

Raw or poorly treated boat sewage is harmful to human health and water quality. Typhoid, hepatitis, cholera, gastroenteritis, and other waterborne diseases may be passed directly to people who swim in contaminated waters. People may also become infected by eating shellfish contaminated with viruses and other microorganisms contained in sewage discharge.

Sewage is also harmful to water quality. Because the microorganisms within sewage need oxygen, any effluent discharged to waterways reduces the amount of oxygen available to fish and other forms of aquatic life. Furthermore, the heavy nutrient load in sewage promotes excessive algal growth. As the algae multiply, they prevent life-giving sunlight from reaching subsurface vegetation. When the algae die they create another problem: the algae are decomposed by bacteria which further reduce levels of dissolved oxygen.

The Law (overhead 2)

According to Federal and State law, it is illegal to discharge raw sewage.

All vessels with installed toilets must have a Marine Sanitation Device (MSD):

- Type I systems mechanically cut solids and disinfect waste. They must bear a U.S. Coast Guard certification label.
- Type II systems are similar to Type I systems. The difference is that they treat sewage to a higher standard and generally require more space and energy. Type II systems must also have a Coast Guard certification label.
- Type III systems do not discharge sewage. Holding tanks are the most common Type III system. Incinerating systems are another option. A Coast Guard label is not required.

Vessels 65 feet and under may have any of these three types of MSDs. Vessels over 65 feet must have a Type II or III system.

Holding Tanks (Type III MSD) (overhead 3)

A free booklet explaining how to retrofit a boat to include a holding tank is available from the Department of Natural Resources (410) 260-8770.

Use good plumbing to control holding tank odor. Fiberglass and metal tanks are highly resistant to permeation. Specially labeled flexible "sanitation hoses" and PVC piping are also highly impermeable. Hose runs should be as short and as straight as possible. Wherever practical, use rigid pipe below the level of the holding tank and in other areas where sewage will accumulate. Keep the number of connections to a minimum and insure that seals are tight.

Use enzyme-based products in your holding tank to further control odor. Enzymatic products use biological processes, rather than harsh chemicals, to breakdown sewage. Be sure to pump and rinse your holding tank prior to initial use of an enzyme product if you have used chemical-based odor control additives in the past. Chemical residues may interfere with the effectiveness of enzyme-based products.

Avoid holding tank products that contain quaternary ammonium compounds (QAC) and formaldehyde. These products may disrupt sewage treatment plants.

Type I and II MSD (overhead 3)

Maintain your Type I or II MSD. Establish a regular maintenance schedule based on your owner's manual to remind yourself when chemicals need to be added, electrodes need to be cleaned, etc.

Do not discharge your Type I or II MSD while in a marina, in a swimming area, over an oyster bar or in a poorly flushed area. Effluent from legal Type I and Type II systems contains nutrients and possibly toxic chemicals. It may contain pathogens as well.

Use shoreside restrooms when in port.

Sewage: Environmental Concerns

- Harmful to human health
- Diseases may be passed to swimmers or to people who eat contaminated shellfish
- Harmful to water quality
- Reduces oxygen available to fish and other aquatic life
- Excess nutrients cause algal blooms
- Excess algae blocks sunlight
- Bacteria that decompose algae reduce dissolved oxygen

Sewage: The Law

- Discharging raw sewage is against State and Federal laws
- All vessels with installed toilets must have a Marine Sanitation Device (MSD)
- There are 3 types of MSDs
- Type I: Cut solids, disinfect and release sewage. Must have a USCG certification label.
- Type II: Similar to Type I, but treat sewage to a higher standard before releasing. Must have a USCG certification label.
- Type III: "holding tanks" that do not release sewage. When tank is full, it is pumped out at a pumpout station. A USCG label is not required

MARYLAND CLEAN MARINA

Sewage: Marine Sanitation Devices

Holding Tanks (Type III)

- Use enzyme-based products to control odor
- Avoid quaternary ammonium compounds (QAC) and formaldehyde

Type I and II MSDs

- Establish a regular maintenance schedule
- Do not discharge in a marina, swimming area, over an oyster bar or in a poorly flushed area

Section Contents
Waste Containment and Disposal

Section Plan

Overheads
- Environmental Concerns
- The Law
- Contain Trash
- Recycle
- Fish Scraps
- Maintenance Waste

Handout
- Clean Boating Tip Sheet–Waste Containment and Disposal

Additional Resources
- "Save our Seas" placard
- Maryland Environment Service's hotline 1-800-4-RECYCLE
- Maryland Department of the Environment's web site: www.mde.state.md.us/was/recycle

Clean Boating Lesson Plan

Waste Containment and Disposal

Time Required: 10 minutes

Objective:
For participants to learn and adopt appropriate methods of waste disposal.

Content and Activity Plan:

Time	*Activity*
10 minutes	Lecture and follow up questions covering:

Environmental Concerns (overhead 1)
Solid waste, particularly plastics, must be contained. There are many well-documented instances of marine mammals, fish, turtles, and seabirds that have become entangled in or choked on plastic marine debris. Plastics also represent a hazard to navigation as they can snare propellers and clog engine intake systems. Divers are, likewise, susceptible to entanglement. Furthermore, solid waste that washes up on shore is unattractive and may be costly to remove.

The Law (overhead 2)
The Marine Plastic Pollution Research and Control Act of 1987 (MPPRCA), Title II of Public Law 100-220, restricts the overboard discharge of garbage. Its primary emphasis is on plastics; it is illegal to discharge plastic materials into any waterbody. The disposal of other types of garbage is restricted according to how far a vessel is out to sea. The important thing to remember is that within the Chesapeake and coastal bays, along rivers, and on inland lakes, the discharge of any garbage into the water is illegal. Fish guts are an exception. The discharge of fish waste into Maryland waters is not desirable, however.

(overhead 3)
- C Within U.S. lakes, rivers, bays, sounds and within 3 nautical miles from the ocean shore, it is illegal to dump anything other than fish waste.
- C Between 3 and 12 nautical miles from shore, it is illegal to dump plastic and any other garbage that is greater than one inch in size.
- C Between 12 and 25 nautical miles from shore, it is illegal to dump plastic and dunnage, *i.e,* lining and packing material, nets, lines, etc.
- C Beyond 25 nautical miles, it is illegal to dump plastic.

Meeting the law is easy. Just follow these tips:

Contain Trash (overhead 4)

C Don t let trash get thrown or blown overboard.
C If trash blows overboard, retrieve it. Consider it "crew-overboard" practice.
C Pack food in reusable containers.
C Buy products without plastic or excessive packaging.
C Don t toss cigarette butts overboard. They are made of plastic (cellulose acetate).
C Purchase refreshments in recyclable containers and recycle them.
C Properly dispose of all trash on-shore, *e.g.,* bring home or leave in a dumpster at the marina.

Recycle (overhead 5)

C Recycle cans, glass, newspaper, antifreeze, oil, and lead batteries.
C Call 1-800-4-RECYCLE for locations.
C Bring used monofilament fishing line to recycling bins at your tackle shop or marina.

Fish Scraps (overhead 6)

Fish cleaning may pose a problem if the guts are discarded into a poorly flushed marina basin. Fish waste is smelly and unsightly. Also, life-sustaining oxygen is removed from the water column as bacteria decompose the innards. Avoid problems by following these tips.

• Do not discard fish waste in poorly flushed areas.
C Clean fish while returning to the dock–if legal for the species.
C Discard waste over deep water or at home.
C Save waste in a sealed container and use as chum or bait.

Maintenance Waste (overhead 7)

Dispose of the following items according to the recommendations listed below. Call 1-800-4-RECYCLE for recycling center locations or visit **www.mde.state.md.us/was/recycle** for the names and numbers of local recycling and hazardous waste coordinators.

Waste Product	Disposal Method
Oil	Recycle
Antifreeze	Recycle
Paint and Varnish	Allow to dry completely (i.e., solidify). Dispose in regular trash.
Solvents and Pesticides	Bring to a household hazardous waste collection day
Expired Emergency Flares	Bring to local fire department or a household hazardous waste collection day

Waste Containment and Disposal: Environmental Concerns

- Solid waste, particularly plastics, must be contained
- Marine animals become entangled in or choke on plastic debris
- Plastics can snare propellers and clog engine intake systems
- Divers can also be entangled
- Solid waste washing up onshore is unattractive and expensive to remove

Waste Containment and Disposal: The Law

- Marine Plastic Pollution Research and Control Act restricts overboard discharge of garbage
- Illegal to discharge plastic materials into any waterbody
- Other types of garbage restricted according to how far a vessel is out to sea
- Remember: illegal to discharge any garbage within the Chesapeake or coastal bays, or along inland rivers or lakes

MARYLAND CLEAN MARINA

Waste Containment and Disposal: Limitations at Sea

- Within U.S. lakes, rivers, bays, sounds and within 3 nautical miles from the ocean shore, it is illegal to dump anything other than fish waste.

- Between 3 and 12 nautical miles from shore, it is illegal to dump plastic and any other garbage that is greater than one inch in size.

- Between 12 and 25 nautical miles from shore, it is illegal to dump plastic and dunnage, *i.e,* lining and packing material, nets, lines, etc.

- Beyond 25 nautical miles, it is illegal to dump plastic.

Waste Containment and Disposal: Contain Trash

- Don t let trash get thrown or blown overboard
- If trash blows overboard, retrieve it
- Pack food in reusable containers
- Buy products without plastic or excessive packaging
- Buy drinks in recyclable containers and recycle them
- Don t toss cigarette butts overboard – they are made of plastic
- Dispose of all trash on shore

Waste Containment and Disposal: Recycle

- Cans, glass, newspaper, antifreeze, oil, oil filters, lead batteries and monofilament fishing line can all be recycled.

- Many marinas accept some or all of these items

- If you need a recycling location, call 1-800-4-RECYCLE

Waste Containment and Disposal: Fish Scraps

- Dumping fish scraps into marina waters poses a problem
- Fish scraps are unsightly and smelly
- They add excess nutrients to water
- As bacteria break down the scraps, oxygen is removed from the water
- Discard scraps over deep water if possible
- Do not dump into marina waters
- Alternatives include: fish cleaning stations at marinas, wrapping and putting in dumpster, or taking it home and disposing

Waste Containment and Disposal: Maintenance Waste

Waste Product	Disposal Method
Oil	Recycle
Antifreeze	Recycle
Paint and Varnish	Allow to dry completely (i.e., solidify). Dispose in regular trash.
Solvents and Pesticides	Bring to a household hazardous waste collection day
Expired Emergency Flares	Bring to local fire department or a household hazardous waste collection day

Waste Containment and Disposal: Maintenance Waste

- Call 1-800-4-RECYCLE for recycling center locations.

- Visit www.mde.state.md.us/was/recycle for the names and numbers of local recycling and hazardous waste coordinators.

Clean Boating Tip Sheet

Waste Containment and Disposal

Trash is ugly and may be dangerous–dangerous to humans and to wildlife. For example, plastic may snare propellers and choke sea turtles. Congress passed a law in 1987 to protect our water–ways from garbage. The Marine Plastic Pollution Research and Control Act (Title II of Public Law 100–220) regulates the disposal of garbage at sea according to how far a vessel is from shore:

- Within U.S. lakes, rivers, bays, sounds, and within 3 nautical miles from the ocean shore, it is illegal to dump anything other than fish guts.
- Between 3 and 12 nautical miles from shore, it is illegal to dump plastic and any other garbage that is greater than one inch in size.
- Between 12 and 25 nautical miles from shore, it is illegal to dump plastic and dun–nage, *i.e,* lining and packing material, nets, lines, etc.
- Beyond 25 nautical miles, it is illegal to dump plastic.

Meeting the law is easy. Just follow these tips!

Contain Trash

- Don't let trash get thrown or blown overboard.
- If trash blows overboard, retrieve it. Consider it "crew–overboard" practice.
- Pack food in reusable con–tainers.
- Buy products without plastic or excessive packaging.
- Don't toss cigarette butts overboard. They are made of plastic (cellulose acetate).
- Purchase refreshments in recyclable containers and recycle them.
- Properly dispose of all trash on–shore, *e.g.,* bring home or leave in a dumpster at the marina.

Recycle

- Recycle cans, glass, newspa–per, antifreeze, oil, oil filters, and lead batteries.
- Call 1–800–4–RECYCLE for locations.
- Bring used monofilament fishing line to recycling bins at your tackle shop or marina.

Fish Scraps

For safety reasons, marinas are often located in sheltered areas–areas that will protect boats from wind and waves during a storm. The same features that protect boats during a storm, however, also limit the exchange of water. Poor exchange, or flushing, means that any waste which is discharged into the water may stay in the same general area for an extended length of time.

Fish cleaning may pose a problem if the guts are dis–carded into a poorly flushed marina basin. Fish waste is smelly and unsightly. Also, life–sustaining oxygen is removed from the water column as bacteria decompose the in–nards. Avoid problems by following these tips.

- Do not discard fish waste in poorly flushed areas.
- Find out what your marina's disposal policy is.
- Bag waste and dispose at home or in a dumpster.
- Dispose over deep water.

Maintenance Waste

Dispose of the following items according to the recommendations listed below. Call 1–800–4–RECYCLE for recycling center locations or visit www.mde.state.md.us/was/recycle/index.html for the names and numbers of local recycling and hazardous waste coordinators.

Waste Product	Disposal Method
Oil	Recycle.
Oil Filters	Puncture and hot drain for 12 hours. Recycle oil and canister.
Antifreeze	Recycle.
Paint and Varnish	Allow to dry completely, *i.e.,* solidify. Dispose in regular trash.
Solvents, Gasoline, and Pesticides	Bring to a household hazardous waste collection day.
Expired Emergency Flares	Bring to local fire department or a household hazardous waste collection day.

For information about the Maryland Clean Marina Initiative, contact the Maryland Department of Natural Resources at (410) 260–8770 or visit www.dnr.state.md.us.

Section Contents
Vessel Cleaning and Maintenance

Section Plan

Overheads
- Environmental Concerns
- Cleaning Carefully
- Maintaining Mindfully
- Recycling Regularly
- Being a Conscientious Consumer
- "Pier Pressure" (boaters influencing other boaters)
- Alternatives to Toxic Products

Handout
- Clean Boating Tip Sheet: Vessel Cleaning and Maintenance

Additional Resources
- Clean Boating Tip Card
- Maryland Clean Marina Initiative web page www.dnr.state.md.us/boating
- *Your Boat and the Bay* available from the Chesapeake Bay Foundation by calling 410-268-8816, or writing: 162 Prince George St. Annapolis, MD 21401.

Clean Boating Lesson Plan

Vessel Cleaning and Maintenance

Time Required: 10 minutes

Objective: Participants will learn and adopt alternative methods of vessel cleaning and maintenance.

Content and Activity Plan:

Time	*Activity*
10 minutes	Lecture and follow up questions covering:

Environmental Concerns (overhead 1)

As a boater, you are well aware of the care your vessel requires. In order to keep your boat safe, reliable, and attractive, you must clean and maintain it. As you do so, minimize environmental impacts by following the recommendations listed here.

Sanding, blasting, and pressure washing are meant to remove paint and marine growth. In the process, toxic heavy metals such as copper and tin may be released. If heavy metals find their way into the water, they may be consumed by mussels, worms and other bottom-dwelling creatures and passed up the food chain to fish, birds and humans. Heavy metals that are not incorporated into living tissue will remain in the sediments where they will substantially increase the cost of dredge spoil disposal.

Paints, solvents, thinners and brush cleaners generally are toxic and may cause cancer. If spilled, they may harm aquatic life and water quality. Additionally, the fumes–known as volatile organic compounds (VOCs)–released by some paints and solvents contribute to air pollution. Likewise, oil and grease from maintenance areas threaten aquatic life.

Many of the cleaning products used on boats are also toxic. Many contain caustic or corrosive elements. They may also contain chlorine, phosphates, inorganic salts, and metals. Even non-toxic products are harmful to wildlife. For example, detergents found in many boat cleaning products will destroy the natural oils on fish gills, reducing their ability to breathe.

Boaters can minimize environmental impacts by following the recommendations listed below:

Cleaning Vessels Carefully (overhead 2)

C Wash frequently with a sponge or nonabrasive pad and plain water. This approach is very effective at removing salt. Additional "elbow-grease" is required to remove stains.

C When detergents are necessary, use soaps that are phosphate-free, biodegradable, and non-toxic. Any soap should be used sparingly because even non-toxic products can be harmful to wildlife. For example, detergents will destroy the natural oils on fish gills, limiting their ability to breathe.

C Wax your boat, if appropriate. A good coat of wax prevents surface dirt from becoming ingrained.

C Clean teak with a mild soap and abrasive pads or bronze wool. This method is safe for the environment and better for the boat than the solvents in standard teak cleaners which tend to eat away at the wood and to damage seam compounds.

C Avoid detergents that contain ammonia, sodium hypochlorite, chlorinated solvents (bleach), petroleum distillates and lye.

Maintaining Vessels Mindfully (overhead 3)

C Collect all paint chips, dust, and residue. Dispose in regular trash.

C Share leftover paint and varnish.

C Use less toxic propylene glycol antifreeze.

C Avoid overkill. Select a bottom paint developed for the mid-Atlantic region.

Recycling Regularly (overhead 4)

The amount of trash heading to the landfill can be greatly reduced by recycling certain materials. Also, recycling can provide uses for otherwise toxic waste such as used lead acid batteries, antifreeze, and oil.

C Recycle used oil, oil filters, and antifreeze.

C Bring used solvents and waste gasoline to local hazardous waste collection days.

C Call 1-800-4-RECYCLE for locations of recycling centers and information about hazardous waste collection days.

C Visit the Maryland Department of the Environment's web page at **www.mde.state.md.us/was/recycle** for local recycling and hazardous waste contacts.

Being a Conscientious Consumer (overhead 5)

• Read product labels. Labels convey information about the degree of hazard associated with a particular product. For example, DANGER equates to extremely flammable, corrosive or toxic; WARNING indicates that the material is moderately hazardous; and CAUTION signals a less hazardous product. Select products that contain no warnings or which merely CAUTION consumers.

C Be wary of unqualified general claims of environmental benefit, *e.g.,* "ozone friendly". A better, more meaningful label would read, "This product is 95 percent less damaging to the ozone layer than past formulations that contained chlorofluorocarbons (CFCs)."

C For additional information about environmentally responsible products, contact Green Seal. Green Seal is an independent, nonprofit organization that sets environmental standards for consumer goods. Products that meet their criteria are awarded a "Green Seal of Approval." You may search Green Seal's database of Green Seal-certified, environmentally responsible products at **www.greenseal.org** or call (202) 588-8400.

"Pier Pressure" (boaters influencing other boaters) (overhead 6)
Showing your peers that you care about clean water and air can be very influential. Don t hesitate to share what you have learned here with your boating friends.

Alternatives to toxic products (overhead 7)
Instructor: Use the overhead provided to give the students an idea of the many toxic products which can be replaced with alternatives. Give students copies of Clean Boating Tip Sheet: Vessel Cleaning and Maintenance to take home.

Vessel Cleaning: Environmental Concerns

- Boats require a lot of maintenance and cleaning
- Paints, solvents, thinners and brush cleaners generally are toxic
- Sanding, blasting and pressure washing remove paint which may contain harmful heavy metals
- Paint chips containing heavy metals could enter the water, and the food web
- Boat cleaners can strip oil from fish gills, reducing their ability to breathe
- Your choice of products and activities can have serious impacts

MARYLAND CLEAN MARINA

Vessel Cleaning: Clean Carefully

- Wash without soap more often – plain water will remove most dirt
- When soaps are needed, use ones that are biodegradable, phosphate- and toxic-free (bleach is considered toxic)
- Use soaps sparingly – remember where they end up
- Wax your boat to prevent surface dirt from getting ingrained
- Conserve water – put a nozzle on your hose and just use what you need
- Clean wood with mild soap powder and a nylon brush – not harsh chemicals

Vessel Cleaning: Maintain Mindfully

- Collect and throw out paint chips
- Use dustless sanders/grinders
- Share leftover paint and varnish
- Use less toxic propylene glycol antifreeze (usually pink in color)
- Avoid overkill – select a bottom paint developed for the mid-Atlantic region
- Dispose of solvents and waste gas properly – accepted at household hazardous waste collection days.
- Call 1-800-4-RECYCLE for information.

MARYLAND CLEAN MARINA

Vessel Cleaning: Recycle Regularly

- Recycling reduces waste going to the landfill
- Recycling makes use of otherwise toxic waste
- Many marinas and gas stations accept used motor oil, antifreeze and lead acid batteries for recycling
- Many marinas also accept cans and bottles for recycling
- To find help or information about recycling in your area call: 1-800-4-RECYCLE
- Or visit the Maryland Department of the Environment on-line at: www.mde.state.md.us/was/recycle

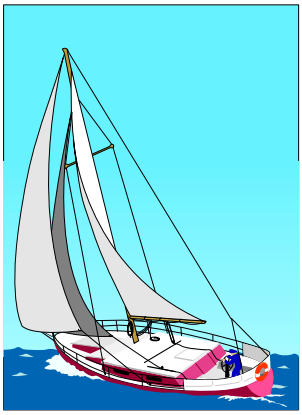
MARYLAND CLEAN MARINA

Vessel Cleaning: Be a Conscientious Consumer

- Read product labels
- DANGER = extremely flammable, corrosive or toxic
- WARNING = moderately hazardous
- CAUTION = less hazardous product
- Select products with minimal warnings when practical
- Be wary of unqualified general claims of environmental benefit
- For more information about environmentally responsible products, contact Green Seal at: 202-588-8400
- Or on-line at: www.greenseal.org

Vessel Cleaning: Pier Pressure

- Let your friends know that your care about clean water and air
- Share information you learn here with them
- In a friendly way, put a little "Pier Pressure" on them to clean up any dirty habits they may have



Vessel Cleaning: Alternatives to Toxic Products

Product	**Alternative**
Bleach	Borax
Detergent & Soap	Elbow grease
Scouring Powders	Baking soda. Or rub area with one-half lemon dipped in borax, then rinse
General Cleaner	Baking soda and vinegar. Or lemon juice combined with borax paste
Floor Cleaner	One cup vinegar in 2 gallons of water
Window Cleaner	One cup vinegar + 1 qt. warm water. Rinse and squeegee
Aluminum Cleaner	2 Tbsp. cream of tartar + 1 qt. of hot water
Brass Cleaner	Worcestershire sauce. Or paste made of equal amounts of salt, vinegar and water
Copper Cleaner	Lemon juice and water. Or paste of lemon juice, salt, and flour

Chrome Cleaner/Polish	Apple cider vinegar to clean; baby oil to polish
Stainless Steel Cleaner	Baking soda or mineral oil for polishing, vinegar to remove spots
Fiberglass Stain Remover	Baking soda paste
Mildew Remover	Paste with equal amounts of lemon juice and salt, or white vinegar and salt
Drain Opener	Dissemble or use plumber's snake. Or flush with boiling water + one-quarter cup baking soda + one-quarter cup vinegar
Wood Polish	Olive or almond oil (interior walls only)
Hand Cleaner	Baby oil or margarine
Head & Shower	Baking soda; brush thoroughly
Rug/Upholstery Cleaner	Dry corn starch sprinkled on; vacuum

Clean Boating Tip Sheet

Vessel Cleaning and Maintenance

As a boater, you are well aware of the care your vessel requires. In order to keep your boat safe, reliable, and attractive, you must clean and maintain it. As you do so, minimize environmental impacts by following the recommendations listed here.

Caution is necessary because your choice of products and activities can have serious impacts on water quality and aquatic life. For example, if paint chips from a hull are not contained, they may end up in the water. The heavy metals in the paint chips may then be consumed by mussels, worms, and other bottom-dwelling creatures and passed up the food chain to fish, birds, and humans.

Clean Carefully

- Wash frequently with a sponge or nonabrasive pad and plain water. This approach is very effective at removing salt. Additional "elbow-grease" is required to remove stains.
- When detergents are necessary, use soaps that are phosphate-free, biodegradable, and non-toxic. Any soap should be used sparingly because even non-toxic products can be harmful to wildlife. For example, detergents will destroy the natural oils on fish gills, limiting their ability to breathe.
- Wax your boat, if appropriate. A good coat of wax prevents surface dirt from becoming ingrained.
- Clean teak with a mild soap and abrasive pads or bronze wool. This method is safe for the environment and better for the boat than the solvents in standard teak cleaners which tend to eat away at the wood and to damage seam compounds.
- Avoid detergents that contain ammonia, sodium hypochlorite, chlorinated solvents (bleach), petroleum distillates, and lye.
- Try some of the alternative cleaning products listed on the reverse side of this page.

Maintain Mindfully

- Collect all paint chips, dust, and residue. Dispose in regular trash.
- Share leftover paint and varnish.
- Use less toxic propylene glycol antifreeze.
- Avoid overkill. Select a bottom paint developed for the mid-Atlantic region.

Recycle Regularly

- Recycle used oil, oil filters, and antifreeze.
- Bring used solvents and waste gasoline to local hazardous waste collection days.
- Call 1-800-4-RECYCLE for locations of recycling centers and information about hazardous waste collection days.
- Visit the Maryland Department of the Environment's web page at www.mde.state.md.us/was/recycle/index.html for local recycling and hazardous waste contacts.

Be a Conscientious Consumer

- Read product labels. Labels convey information about the degree of hazard associated with a particular product. For example, DANGER equates to extremely flammable, corrosive or toxic; WARNING indicates that the material is moderately hazardous; and CAUTION signals a less hazardous product. Select products that contain no warnings or which merely CAUTION consumers.
- Be wary of unqualified general claims of environmental benefit, *e.g., "*ozone friendly." A better, more meaningful label would read, "This product is 95 percent less damaging to the ozone layer than past formulations that contained chlorofluorocarbons (CFCs)."
- For additional information about environmentally responsible products, contact Green Seal. Green Seal is an independent, nonprofit organization that sets environmental standards for consumer goods. Products that meet their criteria are awarded a "Green Seal of Approval." You may search Green Seal's database of Green Seal–certified, environmentally responsible products at www.greenseal.org or call (202) 588–8400.

Alternatives to Toxic Products

While baking soda, vinegar, lemon juice, and vegetable oils are far less harmful than bleaches, scouring powders or detergents, they are still toxic to marine life. Use cleaning products sparingly and minimize the amount discharged into the water. Never dispose of any cleaning products down the thru–hull drain; dispose of them on shore.

Product	*Alternative*
Bleach	Borax
Detergent & Soap	Elbow grease
Scouring Powders	Baking soda. Or rub area with one–half lemon dipped in borax, then rinse
General Cleaner	Baking soda and vinegar. Or lemon juice combined with borax paste
Floor Cleaner	One cup vinegar + 2 gallons of water
Window Cleaner	One cup vinegar + 1 qt. warm water. Rinse and squeegee
Aluminum Cleaner	2 Tbsp. cream of tartar + 1 qt. of hot water
Brass Cleaner	Worcestershire sauce. Or paste made of equal amounts of salt, vinegar, and water
Copper Cleaner	Lemon juice and water. Or paste of lemon juice, salt, and flour
Chrome Cleaner/Polish	Apple cider vinegar to clean; baby oil to polish
Stainless Steel Cleaner	Baking soda or mineral oil for polishing, vinegar to remove spots
Fiberglass Stain Remover	Baking soda paste
Mildew Remover	Paste with equal amounts of lemon juice and salt, or white vinegar and salt
Drain Opener	Dissemble or use plumber's snake. Or flush with boiling water + one–quarter cup baking soda + one–quarter cup vinegar
Wood Polish	Olive or almond oil (interior walls only)
Hand Cleaner	Baby oil or margarine
Head & Shower	Baking soda; brush thoroughly
Rug/Upholstery Cleaner	Dry corn starch sprinkled on; vacuum

Adapted from Buller, Pat. 1995. *Clean Marina+Clean Boating+Clean Water Partnership*. Seattle, WA: Puget Soundkeeper Alliance.

MARYLAND CLEAN MARINA

For information about the Maryland Clean Marina Initiative, contact the Maryland Department of Natural Resources at (410) 260–8770 or visit www.dnr.state.md.us.