

Vessel Maintenance and Repair

Environmental Concerns

Vessels require a great deal of attention. They must be scraped, painted, and cleaned. Their engines need to be lubricated and otherwise tended. The vessel and engine need to be prepared to withstand the cold of winter. Each of these activities can introduce pollutants into the environment.

Sanding, blasting, and pressure washing are frequently employed to remove paint and marine growth. In the process, toxic metals such as copper and tin may be released. If heavy metals find their way into the water, they may be consumed by shellfish, 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 their presence will substantially increase dredge material disposal costs.

Paints, solvents, thinners, and brush cleaners are often toxic and may cause cancer. If spilled, they may harm aquatic life and water quality. Additionally, the vapors released by some paints and solvents contribute to air pollution. Oil and grease from maintenance areas also threaten aquatic life.

Many of the cleaning products used in boat shops are also toxic. Many contain caustic or corrosive agents. They may also contain chlorine, phosphates, inorganic salts, and metals. Even some non-toxic products can harm wildlife. For instance, detergents commonly found in boat cleaning products destroy the natural oils on fish gills, reducing their ability to breathe.

Pertinent Laws and Regulations

Basic Industrial Stormwater General Permit

Any marina that creates runoff discharges to surface and/or ground water must obtain a Basic Industrial Stormwater General Permit (NJ0088315) from the NJDEP. This is designed for facilities to eliminate the exposure of stormwater to industrial source material that is discharged to surface and/or ground water. The permit provides the facility the flexibility to choose pollution prevention measures that are appropriate to the facility's activities and budget.

The General Permit requires that permittees prepare a Stormwater Pollution Prevention Plan (SPPP), and submit the SPPP Preparation Certification to NJDEP within six months of the facility's permit authorization date.

The Basic Industrial Stormwater General Permit does not authorize non-stormwater discharges to surface and/or ground water. The discharge of process wastewater including vessel wash water and discharges from secondary containment other than stormwater to surface or ground water may require a separate permit from NJDEP. Further information concerning requirements for these types of discharges can be obtained from NJDEP (609) 633-3869.

Please refer to Laws and Regulations section for more information about the Basic Industrial Stormwater General Permit.

Organotin Antifoulant Paint Control Act of 1988

The Organotin Antifoulant Paint Control Act restricts the use of organotin antifouling paints, including tributyl tin-based paints. (See Laws and Regulations section).

Best Management Practices to Control Pollution from Vessel Maintenance and Repair Activities

Designate Work Areas.

One of the easiest ways to contain waste is to restrict the area where maintenance activities may be performed.

- ✓ (5) Perform all major repairs such as stripping, fiberglassing, and spray painting in designated areas.
- ✓ (5) Collect all maintenance debris. Clean work areas after completing each operation or at the end of the day, whichever comes first. Remove sanding residue, paint chips, fiberglass, trash, etc.
- ✓ (5) Locate the maintenance area as far from shore as possible.
- ✓ (5) Locate vessel maintenance areas on an impervious surface (e.g., asphalt or cement) and, where practical, under a roof. Sheltering the area from rain will prevent stormwater from carrying debris into surface waters.
- ✓ (5) If asphalt or cement is impractical, perform work over filter fabric, canvas, or plastic tarps. Filter fabric will retain paint chips and other debris while allowing for water penetration. Plastic, on the other hand, should be used carefully because it is impervious and paint chips and debris may be washed into stormwater during a rain. Tarps may be used multiple times.
- ✓ (5) Surround the maintenance area with a berm or retaining wall.
- ✓ (5) Use vegetative or structural controls described in Stormwater Management Section to treat stormwater runoff.
- ✓ (5) Inspect and clean stormwater systems in accordance with an established schedule. Remove trash, sediment, and other debris.
- ✓ (1) Prohibit extensive maintenance or repair work outside of the designated maintenance areas.
- ✓ (1) Clearly mark the work area with signs, e.g., “Maintenance Area for Stripping, Fiberglassing, and Spray Painting.”

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- (5) Post signs throughout the boatyard describing best management practices that boat owners and contractors must follow, e.g., “Use Tarps to Collect Debris.”
- (1) Develop procedures for managing requests to use the workspace, to move boats to and from the site, and to ensure the use of best management practices.
- (5) Collect debris. Have your waste hauler characterize the waste and take it to a facility authorized to manage municipal or industrial solid waste, provided that, if the waste is hazardous, the amount generated is less than 220 pounds per month or less than this quantity is accumulated at any time.

(53) Total Points for BMP

Total N/A Points

Contain Sanding Dust.

- (5) Prevent dust from falling on the ground, into the water, or becoming airborne. Invest in vacuum sanders and grinders. These tools collect dust as soon as it is removed from the hull. Vacuum sanders allow workers to sand a hull more quickly than conventional sanders. Additionally, health risks to workers are reduced because paint is collected as it is removed.
- (5) Require tenants and contractors to use vacuum sanders. Rent or loan the equipment to tenants and contractors.
- (1) Post signs indicating the availability of vacuum sanders and grinders.
- (1) Offer tenants the use of vacuum sanders if you see them working with non-vacuum equipment.
- (1) Conduct shore side sanding in the hull maintenance area or over a drop cloth.
- (1) Prohibit sanding on the water or at least restrict it as often as possible.
- (5) When sanding on the water is unavoidable, use a vacuum sander and keep dust out of the water.

(19) Total Points for BMP

Total N/A Points

Contain Abrasive Blasting Debris.


- (1) Prohibit uncontained abrasive blasting.
- (5) Perform abrasive blasting in the vessel maintenance area within a structure or under a plastic tarp enclosure. Do not allow debris to escape from the enclosure.
- (5) Investigate alternatives to traditional media blasting. Hydroblasting and mechanical peeling essentially eliminate air quality problems. Debris must still be collected on a medium such as a filter cloth ground cover.
- (5) Avoid dust entirely by using a stripper that allows the paint to be peeled off. These products are applied like large bandages, allowed to set, and are then stripped off. When the strips are removed, the paint is lifted from the hull. Dust and toxic fumes are minimized.

- ___ ✓ (5) Invest in a closed, plastic medium blast (PMB) system. These systems blast with small plastic bits. Once the blasting is completed, the spent material and the paint chips are vacuumed into a machine that separates the plastic from the paint dust. The plastic is cleaned and may be reused. The paint dust is collected for disposal. A 50-foot vessel will produce about a gallon of paint dust, substantially less than the many barrels full of sand and paint that must be discarded with traditional media blasting methods.

(21) Total Points for BMP

Total N/A Points

Minimize Pressure Washing Impacts.

- ___ ✓ (1) When pressure washing paint, use the least amount of pressure necessary to remove the growth and leave the paint intact. Where practical, use a regular garden-type hose and a soft cloth.
- ___ ✓ (5) Remove visible solids from wash water. At a minimum, allow large particles to settle out. More thorough treatment involves filtration or chemical or physical techniques to treat the rinse water:
- filtration uses devices such as screens, filter fabrics, sand filters, and hay bales to remove particles;
 - chemical treatment relies upon the addition of some type of catalyst to cause the heavy metals and paint solids to settle out of the water; and
 - a swirl concentrator can be used to concentrate pollutants. Water flowing in this small, compact soil separation device without moving parts, creates a vortex that centralizes the pollutants. Clean water is then discharged.
- ___ ✓ (1) Discharge treated wash water to surface water if no detergents or other chemical cleaning agents were used. If detergents were used, the wastewater must be directed into a sewer system.
- ___ ✓ (5) Alternatively, recycle the wash water through the power washing system (a closed water recycling operation).
- ___ ✓ (5) Pressure wash over a bermed, impermeable surface that allows the wastewater to be contained and filtered to remove sediments.
- ___  Ensure that any wash water that is discharged to surface and/or ground water complies with your NJDEP permit.

(17) Total Points for BMP

Total N/A Points

Box 1. Bottom Paints

Antifouling bottom paints protect hulls from barnacles and other types of fouling organisms that can interfere with vessel performance. Most paints work by slowly releasing a biocide, generally cuprous oxide (Cu_2O). Pesticides in the paint harm fish and other non-target species.

Copper-based paints are not used on aluminum hulls because the interaction of copper and aluminum leads to corrosion. Instead, tin-based paints (tributyl tin or TBT) are often used on aluminum-hulled vessels. Because tin is extremely toxic, it must be applied cautiously. Concentrations of TBT as low as a few parts per trillion have caused abnormal development and decreased reproductive success in oysters, clams, and snails (EPA 1993). Tin is easily absorbed by fish through their gills and accumulates to high levels in sediments. For these reasons, Federal law restricts the use of tin-based paints to aluminum vessels of any length, boats larger than 82 feet (25 meters), and outboard motors and lower drive units. Any boatyard operator wishing to apply TBT paints must obtain a pesticide business license and have a licensed pesticide applicator on staff.

Antifouling paints can be separated into three general categories:

Leaching Paints. Water soluble constituents of leaching antifouling paints dissolve slowly in water, releasing the pesticide. The insoluble portion of the paint film remains on the hull. The depleted paint film must be removed before the boat is repainted. Most leaching paints contain solvents that produce noxious fumes.

Ablative Paints. Ablative antifouling paints also leach some toxicant into the water. The major difference is that as the active ingredient is leached out, the underlying film weakens and is polished off as the boat moves through the water. As the depleted film is removed, fresh antifouling paint is exposed. There are several available water-based ablative paints that are up to 97% solvent free. As a result, levels of volatile organic compounds are substantially less than those of solvent-based paints. Ease of cleanup is another advantage of water-based paints.

Non-toxic Coatings. Teflon, polyurethane, and silicone paints are nontoxic options. All deter fouling with hard, slick surfaces.

Minimize Paint Impacts.

Stay informed about antifouling products.

- ✓ (1) Recommend antifouling paints that contain the minimum amount of toxin necessary for the expected conditions.
- ✓ (1) Avoid soft ablative paints.
- ✓ (1) Use water-based paints whenever practical.
- ✓ (1) Recommend to your customers the use of antifouling products that have limited environmental consequences, such as Teflon, silicone, polyurethane, and wax.
- ✓ (5) Store boats out of the water to eliminate the need for antifouling paints.

(9) Total Points for BMP

Total N/A Points

Minimize Painting Operations Impacts.

- ✓ (1) Use brushes and rollers whenever possible.
- ✓ (1) Use paint spray equipment sparingly.
- ✓ (1) Prohibit spray painting on the water.
- ✓ (1) Limit in-water painting to small jobs. Any substantial painting should be conducted on land, in the vessel maintenance area, and/or over a ground cloth.
- ✓ (1) When painting with a brush or roller on the water, transfer the paint to the vessel in a small (less than one gallon), tightly covered container. Small containers mean small spills.
- ✓ (1) Only mix sufficient paint for a given job.
- ✓ (5) Mix paints, solvents, and reducers in a designated area away from the shoreline and either indoors or under a shed.
- ✓ (1) Keep records of paint use to determine excess usage for jobs. Refer to this information to avoid future overmixing.

(12) Total Points for BMP

Total N/A Points

Reduce Overspray.

In some cases, spray painting is the only practical choice in terms of time and money. Minimize the impact of paint overspray and solvent emissions by employing the following practices:

- ✓ (1) Conduct all spray painting on land, in a spray booth, or under a tarp.
- ✓ (5) Use equipment with high transfer efficiency. Tools such as high-volume, low-pressure (HVLP) spray guns direct more paint onto the work surface than conventional spray guns. As a result, less paint is in the air, less volatile organic

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compounds are released, less paint is used, and cleanup costs are reduced. Air-atomizer spray guns and gravity-feed guns are other types of highly efficient spray equipment.



- (5) Train staff to use spray painting equipment properly in order to reduce overspray and minimize the quantity of paint per job.

(11) Total Points for BMP

Total N/A Points

Handle Solvents Carefully.

Refer to Waste Containment and Disposal for further information about requirements for handling, storing, and transporting hazardous wastes.

-  Store open containers of usable solvents as well as waste solvents, rags, and paints in covered, UL listed, or Factory Mutual approved containers.
-  Hire a licensed waste hauler to recycle or dispose of used solvents.
- (5) Direct solvent used to clean spray equipment into containers to prevent evaporation of volatile organic compounds. A closed gun cleaning system will save you money on cleaning materials.
- (1) Use only one cleaning solvent to simplify disposal.
- (1) Use only the minimal amount of solvent (stripper, thinner, etc.) needed for a given job.
- (1) For small jobs, pour the needed solvent into a small container in order not to contaminate a large amount of solvent.
- (5) Use soy-based solvents and other similar products with no or low volatility.
- (1) Order your spray painting jobs to minimize coating changes. Fewer changes mean less frequent purging of the spray system. Order your work light to dark.
- (1) Allow solids to settle out of used strippers and thinners so you can reuse solvents.
- (1) Keep records of solvent and paint usage to keep track of the amount of hazardous waste generated on site.

(16) Total Points for BMP

Total N/A Points

Minimize Environmental Impacts from Engine Repair and Maintenance.

- (5) Store engines and engine parts under cover on an impervious surface like asphalt or concrete.
- (5) Do not wash engine parts over the bare ground or water.
- (1) Use dry precleaning methods, such as wire brushing.
- (1) Avoid unnecessary parts cleaning.

- ✓ (5) For part washing adopt bioremediating systems that take advantage of microbes to digest petroleum as an alternative to solvent based parts washer. Bioremediating systems are self-contained; there is no effluent. The cleaning fluid is a mixture of detergent and water. Microbes are added periodically to “eat” the hydrocarbons.
- ✓ (5) If you use a solvent to clean engine parts, do so in a container or parts washer with a lid to prevent evaporation of volatile organic compounds. Reuse the solvent. Once the solvent is totally spent, either recycle it on site with a distillation unit or have it removed by an appropriate waste hauler.
- ✓ (5) Use drip pans when handling any type of liquid. Use separate drip pans for each fluid to avoid mixing. Recycle the collected fluid. Use funnels to transfer fluids.
- ✓ (1) Drain all parts of fluids prior to disposal.
- ✓ (5) Clean engine repair areas regularly using dry cleanup methods, e.g., capture petroleum spills with oil absorbent pads.
- ✓ (1) Prohibit the practice of hosing down the shop floor.
- ✓ (1) Provide a test tank for small outboard engines.

(35) Total Points for BMP **Total N/A Points**

Winterize Safely.

- ✓ (5) Use propylene glycol antifreeze for all systems. It is much less toxic than ethylene glycol antifreeze.
- ✓ (1) Use the minimum amount of antifreeze necessary for the job.
- ✓ (5) For health reasons, do not use ethylene glycol in potable water systems; it is highly toxic and cannot be reliably purged from the system.
- ✓ (1) Add stabilizers to fuel to prevent degradation. Stabilizers are available for gasoline and diesel fuels and for crankcase oil. These products protect engines by preventing corrosion and the formation of sludge, gum, and varnish. Use of these products also eliminates the need to dispose of stale fuel at the beginning of the boating season.
- ✓ (5) Be sure fuel tanks are 85-90% full to prevent accumulation of flammable fumes and to minimize the possibility of condensation leading to corrosion. Do not fill the tank more than 90% full. The fuel will expand as it warms in the springtime and may spill out the vent line of a full tank.
- ✓ (1) Use the highest rated octane recommended by the engine manufacturer; premium fuels are more stable than regular fuels.
- ✓ (1) Be sure the gas cap seals tightly.
- ✓ (5) Promote reusable canvas or recyclable plastic covers. Some manufacturers will clean and store canvas covers during the boating season.
- ✓ (1) Recycle used shrink wrap.

(25) Total Points for BMP **Total N/A Points**

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Conduct In-Water Maintenance Wisely.

- (5) If the impacts of cleaning or maintenance activities (regardless of area involved) cannot be contained or mitigated, remove the boat from the water. Do not allow debris to fall into the water.
- (1) Keep containers of cleaning and maintenance products closed.
- (5) Restrict or prohibit sanding on the water. When it is absolutely necessary to sand on the water, use vacuum sanders to prevent dust from falling into the water.
- (1) Do not sand in a heavy breeze.
- (1) Plug scuppers to contain dust and debris.
- (5) Do not spray paint on the water.
- (5) Prohibit underwater hull cleaning in your marina. Given the concentration of boats, underwater cleaning is dangerous to divers and the heavy metals that are released are harmful to aquatic life. In addition, insurance to cover divers is expensive.
- (5) Offer incentives, like reduced mid-season haul out rates, so boaters can have their hulls cleaned on land where contaminants can be contained.

(28) Total Points for BMP

Total N/A Points

Educate Boaters.

- (1) Copy the following Clean Boating Tip Sheet and distribute it to your tenants. There is room to add the name and logo of your marina.
- (1) Find out about local hazardous waste collection events by calling your local county health department. You can also visit NJDEP's list of recycling coordinators, at www.state.nj.us/dep/dshw/recycle/recycoor.htm. Both your county and municipal coordinators are listed. Or call NJDEP at (609) 984-3438 for assistance. Post notices informing your tenants when and where they can take their hazardous wastes.

(2) Total Points for BMP

Total N/A Points

Chapter Total:
_____ (248)

Chapter Total N/A Points:

Vessel Cleaning & Maintenance

As a boater, you are well aware of the care your vessel requires. By following the recommendations listed here, you can minimize the environmental impacts of routine cleaning and maintenance necessary to keep your boat safe, reliable and attractive.

Your choice of products and activities can negatively impact water quality and aquatic life. For example, paint chips from antifouling paints contain heavy metals. When the paint chips accidentally end up in the water they may be consumed by shellfish, worms, and other bottom-dwelling creatures and pass up the food chain to fish, birds, and humans.

CLEAN CAREFULLY

- Wash boat surfaces 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 phosphate-free, biodegradable, and non-toxic soaps. Use soap 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 that tend to eat away at the wood and 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 chart on the back of this page.



MAINTAIN MINDFULLY

- Collect all paint chips, dust, and residue and dispose of 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.
- Take used solvents and waste gasoline to local hazardous waste collection sites.
- Visit the NJDEP's web page at www.state.nj.us/dep/dshw/recycle/recycor.htm for local recycling and hazardous waste contacts.

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BE A CONSCIENTIOUS CONSUMER

- Read product labels. Labels convey information about the degree of hazard associated with a particular product.
 - 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, non-profit 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 202-872-6400.



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 through-hull drain; dispose of them ashore.

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 quart of 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	Disassemble 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 Cleaner	Baking soda; brush thoroughly
Rug/Upholstery Cleaner	Dry cornstarch sprinkled on; vacuum

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

For more information about the Clean Marina Program
visit www.njcleanmarina.org