

Boat Repair Guide

**A Step by Step Guide to Do-It Yourself
Boat Repair and the Environment**



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Introduction

There are a lot of things to consider when starting a boat repair or maintenance project. For many of us the first and foremost concern is getting the job done right the first time, so we can protect our investment and enjoy our time on the water. Of course there are other concerns too: time, expense, personal safety and environmental protection.

This booklet is designed as a field guide to help “Do-It-Yourself” boaters better understand boat repair in terms of Washington State environmental regulations and both voluntary and mandatory Best Management Practices (BMPs) that make a big difference in protecting water quality. We hope you will find this guide useful as you move forward with your project.

Disclaimer:

This guide is intended as a brief introduction to many of the topics that it discusses. It is by no means a definitive resource on all topics of boat repair, environmental compliance or personal safety. Please research each area of your work thoroughly to comply with environmental laws, safety precautions, and boatyard or marina rules. Neither Puget Soundkeeper Alliance nor any of its contributors assume any liability for the accuracy or completeness of the information presented in this booklet.

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What are BMPs?

Best Management Practices are simple practices and procedures that help prevent accidental discharges to the environment. In some cases, required BMPs are legally-enforceable as a condition of boatyard pollution discharge permits.

It is the responsibility of the facility user, whether an employee or a do-it-yourself boater, to perform their tasks in a manner that doesn't violate state law, complies with the facility regulations, including BMPs, and doesn't allow any material to enter the water or stormdrains. Do-it-yourself boaters should obtain a copy of facility regulations and BMPs prior to performing any work.

Why Are BMPs Necessary?

The Washington State marine, lake and river environments are in trouble. Many species of fish, birds, mammals, invertebrates and even some aquatic plants are in serious decline. Federal and state governments have stepped in to protect some creatures by listing them as 'endangered' or 'threatened'. A leading cause of this degradation is toxic pollution, which can lead to additional regulations for impaired waterways. Unfortunately even a local pollution source can have far-reaching consequences. Toxic pollution can travel many miles through underwater and surface currents, or by entering the food chain in animals that ingest the pollution. Toxic pollution accumulates in greater concentrations in the body tissues of predator species, at levels many times what is found either in the environment or in the bodies of their prey. Toxic pollution is considered one of the leading causes of the decline in Orca whales in Puget Sound, and has contributed to their inclusion as a federally-listed Endangered Species in 2005.

Marine Grade Toxics

Many marine-grade products are among the most toxic compounds commercially available, even in small quantities. Heavy metals such as copper, zinc, lead and tin are of special concern because of their persistence in the environment. While safer alternatives exist for some products, for other uses there are still no environmentally-safe substitutes. Furthermore, even products designed to be less-toxic or biodegradable can still be dangerous if discharged to the environment.

Some marine products such as antifouling bottom paint are specifically designed to kill or discourage certain forms of marine life. If discharged into the water they continue to work, putting salmon, shellfish and other resources at risk. Common sense tells us that any product that lists health and safety hazards is also harmful to the environment.

Source Control

Most boatyards are conveniently located next to the water. As we work on our boats, we need to be aware of materials that drop to the ground or become airborne. A pile of paint dust under a work area can get washed away by rainwater and enter the water through a drain in the yard. Wind can also carry airborne dust in to the environment or on to another boat, causing damage to the finish. Do-It-Yourself Boaters should identify the location of storm drains in the yard and pay attention to the wind and weather forecasts. In some cases, a work project that generates large amounts of paint dust may need to be postponed during periods of high wind and rain.

Do-It-Yourself Repairs

In-Slip Repairs

Before beginning a project, the first question often is whether or not we need to haul our boats out of the water at a boatyard, or whether we can perform our repairs in our marina slip.

In-slip or dockside maintenance and repairs should be limited to internal engine work, rigging, or small refinishing projects that are limited to less than 25% (annually) of the deck and superstructures only, not the hull sides or bottom. Otherwise Washington State considers this to be a boatyard activity, and if we exceed these limits we put ourselves and the marina at risk of fines. Even under this limit, it is our responsibility to secure our work area with tarps and to prevent ANY dust, debris, drips or spills from entering the water. Some marinas have their own regulations so it's best to check with the marina office before starting work.

Permitted Boatyards

Pressure washing, hull refinishing and major topside repairs should always be done at permitted boat yards. These facilities have state-issued pollution discharge permits and are required to monitor their impact on water quality and to implement BMPs to minimize pollution. Stormwater runoff from boatyards is regularly tested for oil and grease, metals like copper and other parameters including total suspended solids (particulates).

Some of these yards allow do-it yourself work in their yard for a fee which often includes the roundtrip hauling of your boat, pressure washing the hull and/or temporary yard storage during refinishing/repairs. This fee is often calculated on a per foot basis. Some of these yards have supplies for sale to help you with your project.

As do-it-yourselfers, we need to be aware of our responsibility to comply with boatyard regulations and to protect the environment. If we ignore this responsibility we put ourselves, the boatyard, our environment and our privilege to do our own work at risk.

Safety Notes

The purpose of this guide is environmental safety, but it should be clear that if we are concerned about dangerous chemicals and metals entering the environment, that these very same compounds are hazardous to humans too.

The basics are protecting our eyes, lungs and skin. Always wear eye protection when sanding, painting and varnishing. Protect your lungs by using a high-quality (vapor rated) mask. While masks can sometimes be OK for hand sanding and vacuum sanding, it is recommended to wear goggles, a respirator, and a disposable coverall suit with hood. Use chemical-resistant gloves when handling solvents and adhesives. Have a plan to deal with emergency eye wash situations. Know where the yard's first aid kit is or if there is not one that is accessible, have your own ready. If you are working alone, a cellular phone is a good safety precaution.

In-Slip Repairs

All boat owners are aware of the need for on-going maintenance. Maintaining our boats can improve safety as well as help protect our investment and provide a sense of pride. Many boat owners have discovered that ongoing maintenance is the key to this. Some projects simply can't or shouldn't wait for a yearly or bi-yearly haul-out.

But what about when our boat is in the marina? When does a project become too large? And what can we legally do in our marina slip between trips to the yard?

Carefully read the following BMPs to determine if a repair can be done in the marina or if the boat needs to be hauled out at a permitted boatyard. Contact your marina to determine if additional rules are in effect.

What's Legal in the Slip?

In the Slip BMPs

- In-water hull cleaning below the waterline is illegal for all ablative and soft-sloughing bottom paints, as well as any other bottom paints if a release occurs during the cleaning process.
- Hull repair, refinishing and surface preparation is also illegal when the vessel is in the water. This includes the portion of the hull that is above the waterline. The state has determined that there is no way to be 100% effective in containing the dust and preventing drips while working on the hull of a boat that is in the water. The exception is for minor touchups such as vessel lettering with non-metallic paints.
- For the areas above the sides of the hull such as the deck and vessel superstructure, we are limited to working on a maximum of 25% of the area per year, and only on the areas where the deck of the boat forms a continuous collection surface. Make sure to collect all solids (dust, flakes, chips, drips etc) to prevent them from entering the environment.
- Drop cloths, tarps and drapes must be securely fastened to collect all materials. If necessary they can also be fastened between the vessel and the dock. Clean up of all contained materials must be conducted daily, or more often if necessary, to prevent their release to the environment.
- No work is permitted from a float or another boat.
- As in boatyards, vacuum sanders should be used for paint preparation or removal.
- Tidal grids are only to be used for emergency repair or marine surveying.
- Bilge water discharges that result in a visible sheen are illegal. Any bilge discharge containing detergents or emulsifying agents is illegal. Use absorbent pads to prevent accidental oil discharge.

Dive Services

- Contact the facility operator prior to any diving activity. Diving is prohibited or restricted in many facilities. Dive services can usually be performed for prop repair, surveys and zinc replacement. All materials must be collected and disposed on shore.
- In-water hull cleaning is prohibited for all ablative and soft-sloughing bottom paints, or for other bottom paints if a release occurs during the cleaning process. Some facilities prohibit all in water hull cleaning.

Work Area BMPs

Under the Boat

Before our boat gets to the yard, we will need a single durable tarpaulin (tarp) to form the base of our work area. Typically the boat is placed on a stand on top of this tarp and the edges of the tarp are secured to the ground with weights. The tarp should be free of holes, rips or tears. This tarp will allow us to contain dust, debris and drips for easy clean up. Tarps can present a slip hazard, so we'll need to choose our tarp and footwear carefully. Check with the yard for tarp requirements.

Around the Boat

Once our boat is in place, and if our project will involve sanding, we will need to install additional tarps, drapes or plastic sheeting to completely contain our work area from the gunwale (top of the hull) to the ground. Done properly, this should look more like a tent and less like loose drapes that could blow in the wind. (It helps to make a door that can be opened or closed so that we can easily leave and return to resume work quickly). This sheeting will need to be secured with supports or weights that will keep the area enclosed during moderate wind. If high winds are present, we may have to wait until they subside to safely proceed with our project.

Tools and Materials

Use large rubberized containers for containing bottles and cans of liquid products to guard against spills. A cardboard box or bucket will serve as a repository for tools and gloves. Some yards require removal of all products from the site unless the boat is actively being worked on.

Organize the work area and decide what goes inside and what goes outside the tarped-in area. Once the dust starts flying we will see the value in having the necessities close at hand and in having other items outside of the dust zone.

Work Area

It is our responsibility to secure our work area to prevent ANY dust, debris, drips or spills from entering the water. Some boatyards have their own regulations so it's best to check with the yard office before starting work.

The following BMPs apply to any project that will involve sanding, scraping, grinding or other debris producing activities, above or below the water line.

Bottom Paint Job

One of the most common boat repair jobs is repainting of the bottom of the boat (below the waterline) with anti-fouling paint to inhibit marine growth. Unless there are blistering issues or structural problems, this is often a fairly simple process which can be done by the boat owner in a do-it-yourself area at a permitted boat yard. In order to protect ourselves and the environment, it's wise to stock up on prevention supplies before starting work.

Supplies We'll Need

- A large tarp to cover the entire area underneath your boat that is large enough to allow you to walk all the way around your boat without leaving the tarp
- Enough plastic sheeting, drop cloths or tarps to completely enclose your work area
- Clamps, tape, spare lumber or plastic hoops to secure your sheeting or tarps in the wind
- Large rubberized containers are recommended for containing bottles and cans of liquid products while they are not being used (secondary containment)
- Dual-action or orbital sander with vacuum attachment—check with the yard operator for rental options and minimum performance requirements
- Wet-dry vacuum, broom and dustpan to clean up tarp daily

Safety Items

- Chemical-resistant gloves
- Goggles, respirator or heavy-duty dust mask (depending on the work to be done)
- Plastic suit
- First Aid Kit
- Cell phone for emergencies
- Spill prevention and containment materials appropriate to the job and location

Supplies and Tools

- Sand paper, masking tape, tack cloths, rags, paint rollers and pan, paint brushes, putty knife, paint scraper, small cups for hand-held paint application
- Outdoor extension cords
- A ladder to get on board or to install plastic sheeting at the gunwale

Surface Prep and Sanding BMPs

Paint dust is toxic and must not be allowed to enter the environment. Pathways include airborne dust, or sanding dust on the ground that gets washed away by stormwater, and wastewater from pressure washing and wet sanding. Many bottom paints contain copper and other heavy metals that are used to prevent the growth of marine life on the hull. Unfortunately they will continue to work in this way if they are allowed to be discharged to the waterways.

- Scraping, sanding or other debris-generating activities are prohibited on tidal grids. Use these grids for inspection and emergency repairs only.
- Pressure-wash the boat after it is hauled out. All pressure-wash waste water should be treated and not discharged to surface waters. Make sure the yard has a designated pressure wash pad.
- Do not wet sand in the main yard. If allowed by the yard, wet sanding should be done on the pressure wash pad where the waste water is collected and treated.
- Vacuum sanding is now mandatory in Washington State where dry sanding is appropriate. Non-vacuum grinders are prohibited. Hand sand hard to reach areas. Check for minimum standards for vacuum sanders. Check with the yard operator for rental options.
- When sanding, enclose the entire work area to prevent releases to the air or water. Use tarps, drapes, drop cloths or tent-like structures and make sure that you are protecting all sides of the boat, not just the side that you are working on (see **Work Area BMPs**, page 5).
- Periodically sweep or vacuum the work area to prevent releases of paint dust to the environment. This is especially important if high volumes of dust are created or if it is windy or raining. Do not hose off the area or allow rain to wash dust or debris into a storm drain. At a minimum, a thorough clean up should be done before leaving for the day. Store or dispose of paint debris in a manner that prevents it from getting wet or from entering a stormwater drain.

Bottom Paint Job

To continue the example of a simple bottom-paint job, the next step is to begin the surface preparation. Bottom paint needs to be free from any algae and/or sea life. Depending on the paint type it may need to be scuffed up with sand paper to form a good, clean bonding surface, however many do-it-yourselfers over-do this step, creating excess dust and debris. Read the paint manufacturers instructions. Wet sanding on the pressure wash pad eliminates the dust issue and may be an option, depending on the yard. Careful inspection will also reveal any problems with adhesion from previous paint jobs or if fiberglass blisters are an issue. If the paint is in poor condition it might need to be removed completely (see **Paint Stripping**, page 8).

Paint Stripping

Sometimes when paint is old, flaking or damaged it becomes necessary to remove all the old paint before applying new paint. There are two main methods for paint removal: chemical removal (solvents) and physical removal (abrasive blasting, sanding and scraping). Physical removal is generally preferable, as it has less risk for human health and environmental contamination. Before reaching for a can of paint stripper, try scraping or sanding an area to see if you get the results you want. Very seldom does a chemical paint stripper work perfectly—it is not a wipe on/ wipe off process. Usually there is a persistent goo left behind that is hard to completely remove and the process is quite messy.

Paint Stripping BMPs

Chemical paint strippers are often volatile, hazardous to the environment and pose a safety risk to people working with them. Once the liquefied paint (sludge) is removed, it could enter the environment through storm drains or other means, becoming even more dangerous due to the solvents in the stripping compounds. These are some of the most dangerous chemicals used in boat repair.

- Know what type of paint you are attempting to remove and try less toxic compounds or physical removal (scraping, sanding) if possible. Contain paint scrapings as you would sanding dust (see Surface Preparation, Sanding)
- If a chemical process is necessary, ask for a Material Safety Data Sheet (MSDS) and review it carefully for safety and environmental precautions. Choose a less-toxic paint stripping compound (water or soy-based) if possible. Buy only what you need and follow all directions. Use the minimum amount necessary and thoroughly contain the removed paint sludge. Always use tight fitting lids and securely closed containers to guard against spills and evaporation. Dispose of removed paint sludge or excess stripper as hazardous waste.
- Protect against spills by using drop cloths and secondary containment for open or stored containers. Tightly cap containers to prevent evaporation which can adversely affect air quality and wastes product.

Additional Considerations

- Surface being stripped
- Condition of old paint (does it easily flake off with a scraper?)
- Type of paint being removed, and underlying coat or material being protected
- Size of job
- Disposal needs and options
- Type of safety protection needed

Hand Painting BMPs

Small spills can enter the environment through direct discharge or stormwater. Dried drips can also loosen and be carried away through stormwater. Solvents used for thinning and clean-up can also pose hazards through accidental spills and evaporation.

- Consider if longer-lasting hard bottom paints or less toxic non-fouling barrier coats are right for your boat. Consider antifouling paints with low biocide ratings, if appropriate.
- Buy, mix and pour only the minimum amount of paint necessary. Mix and pour away from the water and use secondary containment such as rubberized containers to guard against spills. On hot days paint can quickly dry in the pan which hurts the finish quality and wastes paint. Save excess paint for future uses. If you have a large quantity, see if the yard or other boaters can use it and save you the trouble of disposal.
- Reuse solvents and thinners by draining the clean product off the top once the solids settle out. Dispose of excess solvents and thinners as hazardous waste.
- Place paint trays in shaded areas where they won't be kicked or stepped on and always use secondary containment to guard against accidental spills.
- Try keeping your tray next to the boat hull while working on the bottom and move it with you as you work, avoiding having to walk back and forth. This also keeps it in the shade and protects against you stepping back to admire your work and stepping in the pan.

Additional Considerations

- Type of paint used (less toxic bottom coatings are now available—see if one is right for your boat and if it is compatible with your existing coating).
- Use eye protection, especially if rolling paint. Use a vapor rated mask and adequate clothing to protect your skin.
- Number of coats needed, volume of paint needed for the job.
- Curing time before recoating and/or returning boat to the water, outside temperatures can influence the set time of the paint.

Hand Painting

When all the nasty work of removing old paint and preparing your surface is done, we are ready to apply new paint. Often this is a sign that the job is more than half over and as we proceed, our boat will start looking better and better. However, even though we are done with the nastiest part of the job, we still need to be careful. It is important not to move too quickly, even though a preset “splash time” (to put our boat back in the water) may be fast approaching.

Most bottom paint and some types of topside paint can be applied with similar tools and techniques as house paint: brushes and rollers.

Topside Work

While minor touch-ups can be done in-slip with appropriate precautions (see **In-Slip Maintenance** in the introduction), it is safer to do it on-shore. Extensive topside work should be done in a permitted boatyard while the boat is hauled out for a bottom paint job or other reasons. Hull repairs are prohibited in the water whether at a marina or at a boatyard.

Brightwork and Gelcoat BMPs

Varnishes are petroleum-based and require similar precautions as oil-based paint. Sanding old varnished finishes produces dust that can enter waterways directly or via stormwater. Drips during varnish application can cause a similar effect as oil spills. Varnish can be highly flammable and potentially hazardous to human health.

Fiberglass and gelcoat repairs require similar precautions. Styrene, the primary component of gelcoat and other polyester resins is an ignitable chemical.

Varnish

- See **Surface Preparation** on page 7 for sanding and dust containment suggestions.
- Consider using a less-hazardous water-based varnish.
- Mix only what you'll need for the job at hand. Consider sharing leftovers with others. Ask the yard about options for re-use or sharing.
- In case of a spill of varnish on land, use absorbent material to clean it up and collect any contaminated soils. Spills in waterways should be contained with booms and mopped up with oil-absorbent pads. Report all spills.

Fiberglass/Gelcoat Repair

- See **Surface Preparation** on page 7 for sanding and dust containment suggestions.
- Minimize waste by working with small quantities of resin.
- Do not place liquid hardener in the trash, it can spontaneously combust if mixed with sawdust and other materials.
- Consult a MSDS sheet for all chemicals that you are working with. Know the risks, safety precautions and approved disposal methods.
- Manage solvents and rags used to apply them as hazardous waste in most cases.

Spray Painting BMPs

Spray paint coatings are often high in Volatile Organic Compounds (VOC) which create environmental and human health risks. The process of spraying creates more airborne pollutants than simple evaporation from other application methods. Large quantities of coatings increase this risk. Spray painting usually requires an ultra clean surface which often means the use of solvents to wipe down the surface prior to coating.

- Avoid unprotected paint spraying or spraying a vessel that is in the water. Paint spraying should be conducted inside designated structures with ventilation and filter systems (preferred) or at designated shore-side areas away from open water, with temporary structures or plastic sheeting provided to minimize the spreading of overspray (minimum requirements).
- If spraying outdoors with protective sheeting, avoid working on windy days when controlling the protective covering and overspray is difficult.
- Use non-toxic, high bonding, and easily cleaned hull coatings.
- Limit the amount of leftover paint and decrease solvent use by using a smaller paint spray gun cup.
- Reuse solvents and thinners by draining the clean product off the top once solids settle out.
- Whenever possible, use brushes and rollers instead of paint sprayers since paint spraying is potentially more wasteful and more harmful to the environment than applying paint by hand.

Permits, Regulations and Yard Rules

Check with the yard if you would like to do spray painting on your vessel. Even if the yard has the necessary permits and even if they allow do-it-yourselfers to spray, you will still have to adhere to strict guidelines.

- The amount of coating allowed to be sprayed is limited.
- You must use High Volume Low Pressure (HVLP) technology.
- You must thoroughly enclose (tarp) the area being spray coated and the yard must maintain records of the coatings used and condition of the tarping.
- The yard may have additional requirements in their permit regarding coatings to be used and Best Available Control Technology (BACT).

Spray Painting

Spray painting is used to achieve high-quality finishes on hulls, topsides and on some rigging and equipment. It is heavily regulated for air quality and technologically advanced and thus is beyond the range of many do-it-yourself boaters. Some yards may not have the necessary permit to do spray painting or may not allow this activity by do-it yourself boaters. In some cases a permitted mobile contractor can be allowed to do minor repairs or touchups even if the yard does not have the necessary permit. Always check with the facility operator.

Engine Repair

For some boaters a stay in the boatyard is the perfect time to do engine maintenance. For others a major engine repair (or replacement) may be the primary reason. The activities described in this section apply to any engine work on boats whether in a boatyard or in a marina slip. With care, engine repair can be safely conducted with zero discharge to the environment

Engine Repair BMPs

Oil Changes/ Recycling/Filter Disposal

- Use a non-spill vacuum-type system for spill-proof oil changes, or to suction oily water from bilges.
- Recycle all waste oil at approved facilities, do not mix with other chemicals/solvents.
- Slip a plastic bag over filters prior to removal to contain drips. Puncture filters and thoroughly drain oil for recycling. Recycle oil filter if available.
- Use absorbent materials to clean up small drips and spills.

Engine Maintenance and Spill Prevention

- Utilize municipal hazardous waste programs for disposal of unwanted gasoline or gas/oil blends.
- Inspect fuel lines for leaks or potential leaks such as cracks and loose connections.
- Consider using absorbent pads under the engine to catch drips before they enter the bilge.
- Use oil absorbent bilge “socks” to remove oil that has leaked into the bilge.
- Never use detergents or dispersants to hide a sheen in the bilge. Instead, pump the bilge and take it to an approved collection facility. Manually clean bilge with absorbent materials.

Oily Rags

- Keep oily rags separated from rags contaminated with hazardous substances such as solvents.
- Dripping rags and absorbents should be managed as used oil.
- Lightly soiled rags and absorbents may be disposed of in the trash if no other hazardous material is present.

Antifreeze

- Segregate from other wastes, do not mix with other chemicals.
- Recycle used antifreeze at an approved collection facility.
- Store in leak-proof sealed containers labeled “waste antifreeze.”
- Use less-toxic propylene glycol antifreeze (usually pink in color) instead of ethylene glycol (usually green) where appropriate.
- Use drip pans and funnels when transferring antifreeze to minimize spills and drips.
- Provide secondary containment for bottles to prevent spills from entering groundwater or stormwater.

Bilge BMPs

Oil, fuel, antifreeze, lubricants and solvents are hazardous to the environment. Small spills add up to big problems for the environment. Even one quart of oil or fuel can contaminate up to 2 acres of water. Engine fluids and cleaners drained to the bilge are extremely difficult to completely remove and can eventually enter the water through bilge water discharges. Cleaning compounds applied to the bilge mask the problem, allowing contaminated water to be released. Gasoline presents an explosion risk anytime vapors are present in a confined space.

- Keep a clean bilge. This will alert you to problems when they occur.
- If your bilge becomes contaminated, disable the bilge pump and clean up the contaminated water with oil absorbent materials available at marine supply stores. Remove the contaminated water and dispose of it appropriately (See **Hazardous Waste**, page 14).
- Consider installing an absorbent bilge sock or an oil-water separator as a preventative measure.
- Never use detergents or dispersants as a means of hiding a release of oil into your bilge. You can't get rid of oil by squirting soap on it. It merely sinks or suspends the oil beneath the surface. It is also illegal and makes retrieval impossible.
- Some boats have a pan underneath the engine to prevent the bilge from becoming contaminated. Consider using oil absorbent cloth under the engine to prevent a release.

Immediately report all spills to both the federal and state authorities:

**US Coast Guard/ National Response Center:
800-424-8802**

**Washington State
Emergency Management Division:
800-OILS-911 or 800-258-5990**

Bilge Notes

Most bilges collect a little water from condensation, rainfall or from seepage around thru-hulls, stuffing boxes and prop shafts. A leaky engine or a sloppy oil change can introduce oil into the bilge. Eventually water will rise high enough to trigger the automatic bilge pump and which would result in an illegal discharge of oil into the environment. The owner/operator is responsible for bilge discharges in the same way they are responsible for directly spilling overboard. This is not just a boatyard issue—this is a concern anytime your boat is in the water, even if you're not onboard. Remember bilge water = sea water. The following tips should help you remain vigilant. Even an engine that "never leaks" can blow a seal, a hose, or have a pump fail, resulting in fuel, coolant or oil entering the bilge quickly.

Fiberglass Repair

While major fiberglass repair is beyond the range of most do-it-yourselfers, skilled workers may consider performing their own repairs. Check with the yard before beginning a fiberglass repair job to find out what type of work is allowed.

Safety Precautions

Safety precautions are similar to bottom paint preparation (see **Supplies You'll Need**, page 6) except a protective suit is necessary due to the skin-irritant properties of glass fibers.

Catalyst (MEKP) is a strong oxidizer and contaminated MEKP rags are an extreme fire hazard. Do not mix or store with combustibles.

Grinding and Preparing BMPs

Grinding fiberglass produces fine particle dust and releases glass fibers to the air. Glass fibers can be very small and can easily become airborne. Glass fibers can cause skin or lung problems and have been shown to cause cancer in laboratory animals.

- Vacuum grinders are required for grinding operations.
- Contain dust and debris as is required for paint preparation (see **Preparing the work Area**, page 5).
- Thoroughly clean the work area after grinding and bag dust and debris for disposal.
- Do not allow rain to carry material to stormdrains.

Laying and Curing BMPs

Laying fiberglass involves working with raw fibers (fiberglass mats), resins, catalysts and solvents. Styrene, a major component of polyester and vinyl ester resins is a listed Hazardous Air Pollutant, a suspected carcinogen, and an eye and skin irritant. In addition, fiberglass work often involves other hazardous substances such as acetone, toluene, dimethyl phthalate (either as components to resin or as a user-applied product).

- Select low-styrene resins when appropriate. Consult MSDS for all products used.
- When cutting glass fabric, contain all fibers to prevent them from becoming airborne. Promptly clean area and double bag debris.
- Use secondary containment to guard against spills. Use pumps and spigots if possible when dispensing liquids.
- Tightly cap containers when not in use to guard against spill, air pollution, evaporation and product waste.
- Buy/mix only enough product for the job at hand.
- Properly dispose or exchange unneeded product.
- Dispose of waste solvents and rags as hazardous waste. (See **Hazardous Waste Disposal**, page 16).

Washing and Waxing BMPs

Detergents (even biodegradable ones) contain surfactants that can change the way fish absorb pollutants or even kill fish or their eggs outright if concentrations are strong enough. Washing painted surfaces also releases oxidized paint. If you see discoloration or cloudy plumes in the water, you are releasing oxidized paint into the water.

Waxes and polishing compounds contain petroleum products that are damaging to the marine environments. These compounds can enter the waterways as stormwater carries bits of wax into drains.

Teak cleaners often contain acids. Teak oils often contain petroleum compounds.

- Consult MSDSs to help you choose least harmful products.
- Dispose of used rags or buffing pads appropriately.

In-Slip

- In order to keep your boat clean, practice regular washing (and scrubbing if necessary) with fresh water to avoid dirt build up. With stubborn stains try **very small amounts of non-toxic, phosphate-free biodegradable soap**. There should be no suds visible on the water.
- Do not use strong detergents or cleaners such as bleach.
- Do not allow wax or polishes to enter the water.
- Use minimum quantities necessary and use tarps to keep loose bits from entering the water. Avoid the use of power-buffing equipment.

In the Boatyard

- Ask the yard about boat washing. If possible, wash the boat only on the pressure wash pad. Washing in the yard increases stormwater problems.
- Apply wax or compound over a drop cloth area with similar precautions as you would paint (See **Hand Painting**, page 9).
- Use the minimum amount of product necessary and promptly clean up any excess wax or compound that lands on the tarp.

Boat Washing

Maintaining a clean boat provides a sense of pride and protects our investment. However the cleaning products we use can be hazardous for the environment so care must be given to when, where and how we proceed.

Hazardous Waste

Many marine products and their leftover wastes are considered hazardous or contain hazardous components. Such products may include certain paints, cleaners, varnishes, solvents, batteries or motor oil. When not used as part of a commercial enterprise, the used or leftover contents of such consumer products are managed as household hazardous waste (HHW), the disposal of which is generally offered free of charge.

Public agencies have made hazardous waste management a priority and have provided special disposal facilities for these wastes. In Washington State HHW or moderate-risk waste facilities are usually operated by county solid waste or health departments. In order to encourage their use, the facilities usually operate free of charge for household use (including non-commercial recreational boating).

Hazardous Waste BMPs

Some products are hazardous because of their reactivity with other chemicals, their corrosiveness or their immediate toxicity. Other products are hazardous because of their long-lasting environmental impacts (heavy metals, lead, mercury etc). Some of these products may be cancer-causing or may be linked to other illnesses in humans. Some may be linked to chronic environmental issues such as declining wildlife populations or fish consumption advisories.

Most landfills and solid waste collection facilities were not built to handle hazardous waste. Hazardous waste, especially in liquid form, can leak out of containers and into groundwater or surface water during storage transfer or disposal. Some of these wastes are hazardous in very small quantities.

What Are the Dangers of Improper Disposal?

Household hazardous wastes are sometimes disposed of improperly by individuals pouring wastes down the drain, on the ground, into storm sewers, or putting them out with the trash. The dangers of such disposal methods may not be immediately obvious, but certain types of household hazardous waste have the potential to cause physical injury to sanitation workers; contaminate septic tanks or wastewater treatment systems if poured down drains or toilets; and present hazards to children and pets if left around the house.

- Buy/use only what you need, share what you don't.
- Store hazardous products in small quantities, preferably in original containers, with secondary containment devices.
- Do not mix wastes.
- Check with your boatyard or marina for disposal options and storage requirements.
- Utilize county-run Household Hazardous Waste Disposal services. For a directory see: http://www.ecy.wa.gov/programs/swfa/mrw/mrw_contacts.html.
- Look for recycling options for antifreeze, used motor oil and other fluids.
- If we leave our wastes behind for marinas or boatyards they will have to pay commercial rates for disposal, and we run the risks of having these costs passed on to us or of losing the option to do our own work.

More Information

Contacts:

Northwest Marine Trade Association	206-634-0911
Puget Sound Action Team	360-725-5444
Puget Sound Clean Air Agency	206-343-8800
Puget Soundkeeper Alliance	206-297-7002
Washington Clean Marina Program	206-297-7002
Washington Sea Grant Program	206-685-8286
Washington State Department of Ecology	360-407-6000

Also Available:

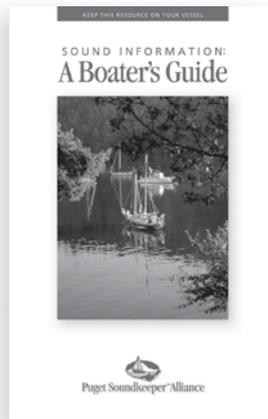
Sound Information: A Boaters Guide

A respected resource for all aspects of boat operation.

- Puget Sound pump-out listings
- Fuel dock listings
- Environmentally-friendly boating tips

For your free copy contact:

Puget Soundkeeper Alliance
206-297-7002



Boat Repair Guide

A Step by Step Guide to Do-It Yourself Boat Repair and the Environment

Help with navigating Washington State environmental regulations and instructions for complying with boatyard best management practices.

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