

# Alaska Seas & Coasts

Marine Issues for Alaska's People

Volume 4 July 2007

## *In this issue*

**Boaters and Harbors**

**Pollution Reporting and Oil  
Spill Response**

**Solid Waste Disposal**

**Chemical Disposal**

**Pyrotechnic Disposal**

**Sewage Disposal**

**Fueling**

**Winterizing and Storage  
Preparation**

**Boat Fire Safety**

**Corrosion**

Alan Sorum, Author

Terry Johnson, Editor

Deborah Mercy, Designer/Editor

Sea Grant Marine Advisory Program  
School of Fisheries and Ocean Sciences  
University of Alaska Fairbanks

## *Clean Boating*

**M**arinas and boat harbors are a lot more than big parking lots for vessels, where we start and end each enjoyable day on the water. They are industrial sites with hundreds of powerful machines, and hundreds of tons of pollutants and toxic wastes. In a very real sense, they are **our** industrial sites, as most marinas and boat harbors belong not to “the government” but are run as self-supporting or profit-making enterprises. That means that the costs are borne by us, the users, including the costs of maintenance, repair, and environmental remediation.

Further, when each of us entrusts our valuable boat and all the commercial or recreational opportunity it represents to a marina or boat harbor, we are turning over one of our most valuable assets to strangers whom we hope will care for it well. Good facility maintenance and management practices should ensure that the boat doesn't deteriorate or diminish in value due to its stay there.

Clean Boating, Green Boating, Responsible Boating—whatever you call it—is an idea whose time has come. Federal, state, and local laws dictate much of the impact a boat should have on the environment. But better than testing the laws and their enforcement, we can protect our boats, help control costs at the facilities, and “do the right thing” for the environment through informed and responsible use of marinas and boat harbors. It's not difficult, we just have to know what to do.

Guest author of this issue of *Alaska Seas & Coasts* is Alan Sorum. Now the Skagway city manager, Alan was harbormaster at Valdez for many years and has a long history in Alaska boating and harbors. He is author of *Northern Harbors and Small Ports: Operation and Maintenance*, published by Alaska Sea Grant, and has written extensively on boating and boat harbor issues. On these pages he offers tips on how to ensure that your boat has minimal impact on the harbor and environment, and how to protect it, in the water and out, from the ravages of winter and potential problems in moorage and storage.

—Terry Johnson, Editor

# Boaters and Harbors

“Clean” or “green,” responsible boating begins at the home marina. Boaters who interact effectively with the management of their marina are a step ahead. Your harbor’s staff can save you time, headache, effort, and money, especially when it comes to protecting the environment. They can help you prevent damage to the environment in several ways.

Many harbors respond to calls of vessels in distress and take appropriate action to prevent a sinking. Efforts are made to boom off the vessel and control oil pollution from sinking boats. Derelict and sunken boats have major and very negative environmental impacts.

Most harbor departments offer free services, including weather forecasts, emergency assistance, and boating safety information. Harbors encourage boaters to file a float plan before leaving the harbor on a trip, which contains basic information about your vessel, the number of people on board, and the proposed route of travel in case you become overdue.

Vessels produce a number of waste streams. Your harbor’s staff can help identify locations of garbage containers, pump-out facilities, used oil dumps, and disposal

sites for materials like antifreeze and used lead-acid batteries. Most harbors have the ability to safely collect, treat, and recycle used nets, used oil, solid waste, oily bilge water, lead-acid batteries, antifreeze, and sewage. Proper disposal of wastes generated by vessels can greatly reduce environmental impacts of boating.

Check in with the harbor before mooring your boat. Many harbors offer lower rates for moorage and launch fees, especially if they are prepaid and arranged for in advance.

## Exotic Plants and Animals

The introduction of exotic, invasive species is a growing concern nationwide for marine users. Species transplanted from one region to another can often out-complete and displace native species, in the absence of predators. Marine exotics can be inadvertently transported by boat hulls and trailers or ballast water, or in some cases, deliberately. To learn about invasive species, ask local authorities or go to the online National Aquatic Nuisance Species Clearinghouse at [www.aquaticinvaders.org](http://www.aquaticinvaders.org), maintained by Sea Grant.

## Pollution Reporting and Oil Spill Response

The Water Pollution Control Act prohibits discharge of any oil product into the water. A spill is defined as any discharge that causes a film or discoloration on the surface of the water or causes a sludge or emulsion beneath the surface of the water. If you experience or witness an oil spill, there are several things you can do to mitigate environmental damage.

Call the Coast Guard on VHF channel 16 or call the National Response Center (NRC) at 1-800-424-8802 to report a spill. Failure to report a spill immediately may result in criminal sanctions. The Coast Guard and other oil spill response organizations depend on your reports; they do not monitor the entire waterfront.

If you have an oil spill on your boat, take immediate action to control its source. Leaks and spills can come from split fuel lines, broken filter sediment bowls, or loose filler caps. Once the cause of the problem is identified and

secured, move to prevent more oil or fuel from going overboard. Block the scuppers on deck with absorbent pads or plastic tarps. Place oil absorbent pads or pillows over patches of free oil found onboard your vessel. Absorbents come in many forms and are available through most fuel distributors.

Weather permitting, you can throw absorbent pads on the water to pick up floating oil. A boathook or oar can be used to move the pad around to collect the fuel. Don’t use detergents or soaps to clean up a fuel spill.

After the excitement has subsided, call the Coast Guard or NRC and report the spill. The Coast Guard is primarily interested in seeing oil spills resolved correctly. Most boaters are not cited for causing small spills if they properly reported them and took prompt action to clean them up.

# Solid Waste Disposal

Boats generate several kinds of solid waste streams that could cause environmental harm if left unchecked. Responsible boaters can effectively mitigate most of the impacts generated by these wastes. Solid waste includes fish waste, nets, fishing lines, plastics, trash, and garbage.

Large amounts of fish waste dumped into a small area can cause an ugly mess that produces foul odors, increased levels of bacteria, and lower water quality. Decomposing fish waste reduces the amount of dissolved oxygen in the water. Most marinas that support subsistence or recreational fishing activity provide fish cleaning facilities, and some marinas provide fish cleaning stations on floating barges to facilitate waste disposal. Boaters should try to clean their fish before entering the marina.

To prevent or reduce pollutant discharge, marinas nationwide are using **best management practices** (BMP). Clean boating depends on boaters understanding best management practices.

## Best Management Practices for Fish Waste

Encourage your marina to provide adequate fish cleaning facilities for public use. The facilities can include

- A stainless steel sink connected to the sanitary sewer system equipped with a heavy-duty garbage disposal for small amounts of fish waste.
- A fish-cleaning table equipped with plastic or galvanized steel waste containers that can be emptied each day.
- A fish-cleaning table or station with floating waste containers that can be towed to open, deep water.
- Don't dispose of fish waste in areas where cleaning facilities are not available. Do not feed fish waste to marine mammals or seabirds.

Used fishing line, fishing nets, and plastics pose a number of problems. These materials do not break down easily in the environment. Fishing nets are bulky and don't compress when buried in a landfill. Discarded gillnets and fishing lines pose a serious hazard to marine wildlife such as sea otters, which can become entrapped in the net, and shorebirds, which become entangled in fishing lines. Commercial fishermen have been in the forefront of recycling used fishing nets. They know their livelihood depends on maintaining a healthy environment to sustain the fishing resource.

Since plastics take so long to degrade, they build up in the environment. Items like six-pack holder rings, monofilament fishing line, packing peanuts, fishing nets, and the like raise major havoc with marine wildlife. Boaters can suffer harm as well; plastic bags can be drawn into engine cooling systems or a discarded floating line can become wrapped around a propeller.

## Best Management Practices for Fishing Line, Fishing Nets, and Plastics

- Bring everything back from your boating adventures.
- Throw nothing overboard.
- Encourage your marina to provide facilities for collection of solid wastes like plastics.
- Support and encourage enforcement of all environmental regulations.
- Reduce your personal use of plastics and plastic packing materials.
- Participate in cleanup day activities and pick up trash when you see it.
- Leave the beach or campsite cleaner than you found it. Since 80% of plastic debris that pollutes the ocean comes from the uplands and not from boaters, local communities can do a better job maintaining their storm sewer systems, solid waste disposal facilities like landfills, and trash collection.

Harbor activities generate large amounts of trash. Improper disposal of garbage is a hazard to human health and the environment. Improperly handled trash and litter is an eyesore and reflects poorly on your community.

## Best Management Practices for Trash and Garbage

- If your community has a viable recycling program, use it. Look for marked containers for recyclables.
- Learn to separate potential hazardous waste from ordinary trash or garbage. Hazardous waste includes used oil, antifreeze, and batteries.
- Where possible, use a trash container fitted with a windscreen. This will improve your harbor's appearance and keep the trash in the container.

# Chemical Disposal

Care and maintenance of a vessel has a major influence on the environment. Most marina operators know the environmental damage that can be caused by improper management, but the message hasn't reached all the boaters using the marinas. Vessel use and maintenance generates a variety of chemicals that are harmful if casually released into the environment. A few simple practices can protect the environment and the continued use of your mooring facility. **Used oil** has great potential to become a hazardous waste and harm the environment if it is not handled properly. In order to be recyclable, used oil must be protected from contamination with gasoline, antifreeze, water, and solvents. If used oil is contaminated, it must be treated as a hazardous waste.



Alan Sorum

**Lead-acid batteries** are found in virtually all harbor vessels. Battery components are toxic and corrosive, and can be a fire hazard. Sulfuric acid will burn skin and eyes on contact. Lead is a well-known health hazard. Lead and sulfuric acid can readily contaminate soils and require expensive cleanup. The batteries are often abandoned and left in our communities for disposal.

## Best Management Practices for Batteries

- Recycle—do not dispose of lead-acid batteries with other solid wastes.
- Handle carefully to prevent broken cases and acid spills.
- If a battery is broken, place it in an acid-resistant, sealed container. A 5-gallon plastic bucket works for small batteries.
- Store batteries in an upright position, protected from the weather.
- Never drain or break battery cases.

**Contaminated fuel or water** is a common problem in harbors and can be difficult to handle. To keep water out of fuel, fuel caps and vents on vessels should be designed to prevent rainwater from entering the fuel tank. Label fuel, hydraulic, and water tanks, to prevent accidentally pumping diesel fuel into water tanks, and gasoline into diesel tanks.

Unfortunately, oily bilge water is often pumped overboard. Oily bilges can be prevented in several ways. Proper maintenance and replacement of filters, tight connections, crankcase vent filters, and adequate surveillance will prevent many leaks into the bilge. Treatment options on a boat include placement of absorbent socks and using active bilge pump filter systems.

**Antifreeze** is used as an engine coolant and to prevent freeze damage to boat plumbing during winter storage. Ethylene glycol, the engine coolant that typically is a green color, is toxic to wildlife and domestic animals. The pink propylene glycol antifreeze used to treat plumbing (water and wastewater) for winter storage is significantly less toxic than ethylene glycol.

## Best Management Practices for Antifreeze

- Replace antifreeze only when it is necessary.
- Check antifreeze visually for free contaminants and test it for freeze point and pH. Fresh antifreeze can be added to adjust these values without wasting the antifreeze.
- Use propylene glycol instead of ethylene glycol where possible.
- If reusable antifreeze is removed during a repair, save it in a clean container and replace it in the cooling system after the repair is finished.
- Save usable antifreeze in sturdy clean containers marked "Used Antifreeze for Recycling".
- Do not mix antifreeze with other wastes such as used oil or fuel.

Boaters should be concerned about **liquid and aerosol paints**, and especially the anti-fouling bottom paint used on vessels in boatyards. The paints are toxic on purpose; the most common biocide agent in use at this time is copper. Paint runoff, overspray, and chips can build up in the environment and cause large cleanup bills. As an alternative, new, nonpoisonous products are entering the market that limit marine growth on hulls.

#### **Best Management Practices for Paint**

- Use antifouling paints containing the minimum necessary amount of toxin.
- Avoid the use of soft ablative paints and use water-based paints where possible.
- Minimize the use of paint sprayers on boats.
- Use brushes and rollers whenever possible.
- Tarp or shroud vessels to avoid overspray or runoff of paint onto the ground or into the water.
- Mix paints, solvents, and reducers in a designated area.
- Purchase only enough paint to complete the job.
- Dry out empty paint cans completely prior to disposal.
- If your boat is trailerable, consider hauling it out and cleaning and waxing it regularly, on the uplands.

#### **Best Management Practices for Hull Scrapings and Sanding Products**

- Use dustless or vacuum sanders to remove paint and retain the material.
- Place tarps or filter cloth under the vessel to collect paint and scraping chips.
- Paint removal should be done in an enclosed or sheltered structure or in a tarped enclosure to contain airborne debris and dust.
- Avoid paint removal activities on windy days if an enclosed maintenance shelter is not available.
- Use minimal abrasion when cleaning anti-fouling paints
- Collect all resulting trash, debris, paint chips, fiberglass, blast grit, and residue from paint removal. Dispose of properly. Paint residue and blast grit must not be disposed of in the trash, or construction materials dumpsters, unless tested by an approved laboratory and certified as not being lead based.
- Avoid in-water bottom cleaning, hull scraping, or any other process occurring in the water that could remove antifouling paint and introduce it into the water.

## **Pyrotechnic Disposal**

**Pyrotechnic Visual Distress Signals** are carried on most vessels to comply with U.S. Coast Guard boating safety regulations. Since these signals are made of chemicals that decompose over time, their certification for use expires after three years. Signals stored properly will last longer than this, but most boats offer poor conditions for storage.

Expired pyrotechnic signals will eventually be unusable. Disposal of these signals presents many problems. The chemicals are toxic and can harm the environment. Indiscriminant firing of signals can generate false alarms and expose first responders to risk.

#### **Best Management Practices for Pyrotechnic Signals**

- Keep expired flares that are still in good condition to use as supplements to current-dated signals.

- Store signals in a sealed watertight container.
- Ask local public safety agencies if you can donate expired signals for use in training exercises or safety demonstrations.
- Ask your signal retailer if they will accept expired signals when you purchase replacements.
- Ask if your local hazardous waste facility will accept expired signals.
- If you decide to fire expired signals rather than dispose of them, inform local rescue authorities of your plan, and then ignite hand-held flares in a safe area on land like you would use a highway flare.
- Do not shoot rocket flares where they can hurt anyone, start a fire, or cause observers to think there is an emergency.
- Seek approved alternative USCG-approved visual distress signals that are not chemically based.

# Sewage Disposal

Boaters need to properly treat and dispose of the sewage that they create. The discharge of sewage is highly regulated, and most vessels with cabins carry a Marine Sanitation Device (MSD) that is certified by the U.S. Coast Guard. Correct use will help prevent the spread of waterborne diseases and protect overall water quality.

Onboard sewage systems include portable devices and several types of permanent systems. Portable toilets, common on smaller vessels, are easy to take on and off the boat. Boaters should empty and clean these units at approved upland disposal sites.

Certified MSDs are classified by type. Type I and II systems provide basic treatment of the sewage before it is discharged overboard. Type III systems have a holding tank. They are some of the simplest systems found on boats and are in common use on small craft. Most type III systems include a Y valve that can allow raw sewage to be discharged directly overboard. Discharge of raw sewage is generally prohibited within three miles of the coastline. Coast Guard regulations require that Y valves be secured to the holding tank position while the vessel is operated within three miles of shore.

Encourage your passengers to use restrooms on shore prior to departure. Promote the construction of adequate restroom facilities at the marina in your community. Use the holding tank of your vessel and avoid discharge of sewage into the water.

Bring your vessel back to the marina and pump it out at an approved facility. Pumpout systems are becoming common, and grant funding is readily available for harbors to construct new pumpout systems. To find the location of the nearest pumpout or dump station call 1-800-ASK-FISH.

The Boat U.S. Foundation offers instructions for pumping out your holding tank:

- Remove cap from boat's deck waste fitting.
- Insert pumpout hose nozzle into deck fitting.
- Turn pump on. If there is a hose valve, open it to start suction.
- When no waste is seen in the sight glass, close hose valve and remove nozzle from deck fitting.
- Put nozzle (with open valve) in bucket of water for 15 seconds to rinse hose. Rinse boat's tank with water and pump dry.
- Close valve.
- Put away hose.
- Turn off pump if required.
- Replace deck fitting cap.

Keeping fuel and oil out of the water protects wildlife, ensures future access to marine resources, and prevents hefty fines. Fuel spills pose fire hazards to boat and facility operators. There are many strategies to prevent fuel spills on a boat. You should know how much fuel your tanks can hold and how much you've consumed since last fill-up. This helps you to anticipate when to stop filling. Install an air-fuel separator or whistle on your boat's fuel tank vent line. These devices provide an audible warning when the tank is nearly full. Carry absorbent pads that can be wrapped around the fuel nozzle as the tank is filled, or get one from the attendant.

Portable tanks should be filled at an upland service station. Spills caused by filling these tanks are much easier to clean up onshore, and the spill will not reach the water. It is safer to fill portable fuel tanks on the ground, which reduces the buildup of static electricity and the chance of an explosion-causing spark. If fueling portable tanks at a dock, remove them from the boat.

Try to take fuel at times when wave and wake action are minimal, and at the side of the fuel dock or float that is most sheltered from waves. Air trapped in fill lines, blowback, and fuel tank sloshing due to boat wakes can cause fuel to be spilled. Also, study the sizes of your tank's fill and vent lines, and the filler nozzle. Tank vents commonly are much smaller than fillers; this allows pressure to build, which causes blowback. Large nozzles that fit snugly in the filler pipe, and prevent air from escaping, contribute to the blowback problem. It's best to use a smaller diameter

nozzle and a lower volume pump; your tanks will fill more slowly but more safely.

Following are some safe procedures for fueling a boat:

### **Before Fueling**

- Stop all engines including auxiliaries.
- Shut off the power supply, open flames, and heat sources.
- Check bilges for fuel vapors.
- Extinguish smoking materials.
- Close access fittings and openings that could allow fuel vapors to enter the boat's enclosed spaces.
- Remove all passengers from the boat except the person handling the fueling hose.

### **During Fueling**

- Maintain nozzle contact with fill pipe.
- Attend the fuel filling nozzle at all times; marine fuel nozzles may not automatically shut off like a car fuel nozzle.
- Wipe up spills immediately.
- Avoid overfilling.

### **After Fueling and Before Starting Engine**

- Inspect bilges for leakage and fuel odors.
- Ventilate until odors are removed.
- Don't use soap or detergent to disperse spilled fuel. Detergents sink fuel into the water column where it has prolonged contact with wildlife. It is better to let gasoline evaporate; diesel should be contained and mopped up with absorbent pads.

# Winterizing and Storage Preparation

Your extra effort at the end of the boating season to prepare your vessel for winter storage will make it much easier to get back on the water come spring. Before storage, there are steps you can take to better prepare your boat for storage and protect the environment.

To get ready for storage, wash and wax your boat hull at the end of the season. Clean your interior carpets and floors. Remove cushions, personal flotation devices, and other items that could mildew. Service and winterize your engine per the manufacturer's recommendations. Spray the exterior of the engine and other metal parts in the engine compartment with a corrosion blocker to prevent formation of rust due to condensation over the winter. Double-check your bilges and ensure they are free of oil or fuel. Place an absorbent pillow in the bilge. There are very effective oil absorbent rings that can be installed around your bilge pump to prevent the discharge of oil.

Drain fresh water lines and fixtures, and then winterize them with the pink, nontoxic propylene glycol antifreeze. Avoid the green ethylene glycol antifreeze used in engines, which is highly toxic and difficult to remove from fresh water systems.

Boaters normally leave their fuel tanks full for the winter to prevent condensation. Many regions now use ethanol fuels, and ethanol absorbs water from the atmosphere, so it may be better to drain the fuel tanks and have them cleaned before use in the next season. Remove lead-acid batteries and store them fully charged in a well-ventilated, warm location like a heated garage. Rest them on a nonconductive surface that is up off the floor. Batteries may be charged at periodic intervals during storage.

If you use installed or portable heaters and air dryers on your boat while it is in storage be sure you set them up so they operate safely. Harbor staff can provide suggestions on how to use these devices safely. Consider the use of a "shrink wrap" covering system or tarps to keep rain and snow out of the vessel. Ensure there is good ventilation under the covers to reduce corrosion or fungal damage to the boat.

## Upland Storage

The efforts you make to store and winterize your boat at the end of the season will have consequences for the environment and for the ease you experience in returning the vessel to service in the spring. Nothing should leak from the boat during maintenance or off-season storage. Vessels too large to be stored on a trailer need to be blocked up properly in the boatyard. Improper blocking can cause substantial damage to a stored boat. In a marina or commercial boatyard the staff probably does all the blocking, but if you want to ensure that they're doing it right, or if you're doing it at home, here are some tips on blocking and on general winterizing and storage.

### Blocking a Boat

Consider using jack stands designed for use with boats. Wooden cribbing will work, but wood blocks are heavy, they decay, and they can slip. Jack stands are easier to use. Never use steel drums for cribbing. Use jack stands in pairs, matching their locations across from each other. Tie the pairs of stands together, preferably with a steel chain designed for the purpose. Make sure each stand rests upon a solid surface. Use at least three pairs on boats over 26 feet in length. Add more support for overhangs and outdrives. Support the keel with adequate timbers. Use substantially sized material and evenly place blocks at multiple points along the keel. Don't scrimp on keel blocks. The weight of the boat should rest on the keel. Jack stands should be placed outboard as far as possible from the keel to increase stability. Jack stands should not deflect the surface of the hull due to high point loads. Don't put blocks under stands to make them taller; use taller stands.

If you tarp over or cover your boat, ensure that water drains away from it and doesn't pool under the vessel. Don't tie off tarps to jack stands. Wind blowing on the tarp can pull out the stands.

Following these guidelines will help protect your boat and the environment.





Alan Sorum

### **In-Water Storage**

For boaters who store their vessels in the water, preparation helps preserve the boat and can prevent sinking. The cost of recovering a sunken boat runs in the thousands of dollars, and the environmental costs are even higher. Vessel owners who allow their boats to sink can face substantial penalties imposed by the Coast Guard and other environmental resource agencies. Areas of concern include protection from the weather, mooring practices, vessel system maintenance, fire safety, and housekeeping.

### **Winter Mooring to Floats and Piers**

It is vital to use adequate mooring lines and fenders for securing your boat in the winter. Double your mooring lines and ensure you are using line that is adequately sized for your boat. Chafing gear should be in place where lines run through vessel chocks or lie over sharp corners. Used fire hose, a leather wrapping, or an extra layer of braiding on the line will help prevent excess wear. Use multiple fenders to prevent damage to your boat from the dock. Secure your fenders to the vessel and not the float. If your boat slip is oriented in a favorable direction, tie your boat bow into the prevailing wind.

**Adequate Lines** Use a minimum of four lines to secure a boat, including a bow line, spring lines fore and aft, and a stern line. Spring lines run from either the fore or the aft end of the boat to the dock. Using two spring lines tied in opposite directions will limit the movement of the boat fore and aft. Bow and stern lines keep the ends of the boat from swinging away from the dock.

**Line Quality** Do not secure a valuable boat with only a thin piece of polypropylene line. Many boaters like to use double braided nylon or dacron line. Nylon stretches and can help absorb shocks to the boat. Practice a little marlinspike seamanship by learning to splice your own lines and tying correct knots.

**Line Size** Following are some basic guidelines for line sizing. Using line of the next size up for your boat length is not a bad idea.

<b>Under 20 feet</b>	<b>3/8 inch</b>
<b>20-30 feet</b>	<b>1/2 inch</b>
<b>30-40 feet</b>	<b>5/8 inch</b>
<b>40-70 feet</b>	<b>3/4 inch</b>
<b>70-90 feet</b>	<b>7/8 inch</b>
<b>90-110 feet</b>	<b>1 inch</b>
<b>110-130 feet</b>	<b>1-1/8 inches</b>
<b>130-150 feet</b>	<b>1-1/4 inches</b>

**Cleats and Bullrails** When securing your boat, be sure to use the cleats and bullrails provided by the harbor. Adding a cleat held by lag bolts will not adequately secure a boat. A well-installed cleat is fastened with bolts that go clear through it and a structural member of the dock.

# Boat Fire Safety



AMSEA

## Boat Fire Safety

The National Fire Protection Association (NFPA) has developed fire safety standards (NFPA Standard 303) that are especially important for boats placed in long-term storage. It covers things like shore power cords, heaters, battery chargers, and other fire hazards. Your harbor should have policies in place to protect moored vessels based on NFPA 303.



Kurt Byers

## Fire Safety Principles

Shore power cords need to be designed for marine use. Household extension cord is not acceptable. Cords must be continuous in length, have no splices, and rated to carry at least 15 amps of load.

Faulty electrical heaters cause many boat fires each year. Use portable heaters with caution and ensure they are equipped with a shut-off switch in case they are tipped over. If you use a heat lamp, make sure the socket is made of porcelain and approved by a rating organization like Underwriters Laboratories (UL).

Battery chargers can cause fires and other problems onboard. Don't use an automotive charger on a boat. If lead-acid batteries are left onboard for the winter, ensure their storage compartment is well ventilated. Use a UL-approved marine battery charger on your boat. The installed charger should have its own dedicated power circuit, be wired into the vessel electrical system with no less than #14 AWG copper wire, and be provided with a circuit breaker. Make sure the charger is well grounded.

Your harbor should enforce policies that regulate the use of shore power cords to help reduce stray current and fire hazards. Only marine power plugs are allowed. They have circular blades made to lock into the electrical receptacle by twisting them after insertion and are designed to resist being inadvertently inserted into the wrong type of electrical service.



AMSEA

## Corrosion and Electrolysis

Boats left in the water are subject to damage caused by galvanic corrosion and electrolysis. A little preventive care can easily save vessel owners thousands of dollars in the repair of boat damages.

## Galvanic Corrosion

Galvanic corrosion is caused by the electrical current that is generated when two dissimilar metals come into electrical contact with each other through immersion in an electrolyte like salt water. They can be aboard a single vessel or involve multiple vessels. These are some potential causes of galvanic corrosion:

- Using dissimilar metals on the vessel such as steel bolts or copper-based bottom paint on an aluminum hull.
- Mixing different types of bottom paint on the same vessel.
- Mooring vessels with incompatible hull construction next to each other, such as a steel vessel placed immediately next to an aluminum vessel.

Galvanic corrosion can be prevented or kept in check through correct use of adequate zinc anodes, and by properly bonding the metal parts of the boat to the zincs. Consult any of the many vessel maintenance texts on effective use of zincs and bonding.

## Electrolysis

Electrolysis is much more destructive than galvanic corrosion and is normally caused by stray electrical current. Prevention depends on proper vessel wiring and

identification of possible outside sources of stray current.

These are a few possible sources of electrolysis:

- Using a common car battery charger. Most car battery chargers have their primary and secondary transformer windings electrically connected, which allows stray current to enter the vessel's grounding system. Use a marine-rated charger with an isolation transformer to prevent current from passing across the charger's windings.
- A welder using DC current if any of the welding cables are frayed or bare. Place the welder on the vessel being repaired.
- Having two bilge pumps with their connections reversed. That is, the frame of one pump is negatively grounded and the frame of the second pump is connected to the positive side of the electrical system.
- The ground and neutral of the vessel's electrical system are not isolated or the shore power cord is improperly connected. Power should be taken only from the hot and neutral terminals.

Good zinc anodes and bonding will help stave off electrolytic damage, too, but may not be enough to ward off its powerful effects. If you find yours is a "hot" harbor, consult with your harbormaster about the best ways to protect your boat.

Tilting the lower unit of your outboard motor all the way out of the water can prevent electrical damage to the unit, and will also prevent overheating due to barnacles and kelp blocking cooling water passages.

*Alaska Seas & Coasts* is periodically published by the Alaska Sea Grant Marine Advisory Program. Sue Keller, managing editor. Jen Gunderson, prepress coordinator. Cover photo by Deborah Mercy.

*Alaska Seas & Coasts* issues are available as PDFs at [alaskaseagrant.org](http://alaskaseagrant.org). To subscribe to *Alaska Seas & Coasts* please contact [fypubs@uaf.edu](mailto:fypubs@uaf.edu). Alaska Sea Grant, University of Alaska Fairbanks Fairbanks, AK 99775-5040



## Author



Kurt Byers

*Alan Sorum is city manager of Skagway, Alaska, and immediate past port director and harbormaster in Valdez, where he worked for seven years. Alan also worked for the ports of Wrangell and Whittier, Alaska. He has been extensively involved with port and harbor planning efforts for 10 years.*

## Editor



Deborah Mercy

*Terry Johnson is the Alaska Sea Grant Marine Advisory agent and marine recreation and tourism specialist in Homer. He has operated commercial fishing and charter vessels out of Alaska harbors, from Metlakatla to Nome, since the late 1970s.*

Sea Grant  
Alaska

## Marine Advisory Program

[marineadvisory.org](http://marineadvisory.org)



### Anchorage

1007 West 3rd Ave., Suite 100  
Anchorage, AK 99501  
907-274-9691

### Bethel

UAF Kuskokwim Campus  
P.O. Box 368  
Bethel, AK 99559  
907-543-4560

### Cordova

P.O. Box 830  
Cordova, AK 99574  
907-424-7542

### Dillingham

P.O. Box 1549  
Dillingham, AK 99576  
907-842-1265

### Homer

3734 Ben Walter Lane #205  
Homer, AK 99603  
907-235-5643

### Juneau

3032 Vintage Blvd., Suite 104  
Juneau, AK 99801  
907-465-8746

### Kodiak

118 Trident Way  
Kodiak, AK 99615  
907-486-1517

### Nome

UAF NW Campus, Pouch 400  
Nome, AK 99762  
907-443-8410

### Petersburg

P.O. Box 1329  
Petersburg, AK 99833  
907-772-3381

### Unalaska

P.O. Box 526  
Unalaska, AK 99685  
907-581-4589

## Alaska Seas & Coasts

University of Alaska Fairbanks  
P.O. Box 755040  
Fairbanks, AK 99775-5040

ADDRESS SERVICE REQUESTED