

Prevent Theft

Take electronics, ship's documents, personal belongings and other valuable gear off the boat to protect them not only from wind and water damage, but also from vandals who comb through boatyards after a storm.

Seal It Off

Remove cowl ventilators and seal the openings. Duct tape over the covers to instrument gauges and around hatches, ports, lockers, and other openings. Close all but the cockpit drain seacocks and bang plugs into engine exhaust ports.

Suggested Reading:

Chapman: Piloting, Seamanship, & Small Boat Handling, by Elbert Maloney. 632 pages. Hearst Marine Books
The Complete Book of Anchoring and Mooring, Second Edition, by Earl Hinz. 331 pages. Cornell Maritime Press.
Anchoring, by Don Bamford. 238 pages. Seven Seas Press, Inc.
Oceanography and Seamanship, by William Van Dorn. 436 pages. Dodd, Mead. & Co.

Acknowledgments:

BoatU.S. Marine Insurance

The U.S. Coast Guard, Group Charleston

For more information, contact your local marina, or:

The U.S. Coast Guard – Marine safety office: (843)-724-7686

NOAA (Natural Oceanic and Atmospheric Administration): (843)-740-1200

SCDNR (South Carolina Department of Natural Resources): (843)-762-5000

Charleston County, S.C. Area Project Impact: (843)-202-6940



HURRICANE
WARNING

A Boat Owner's Guide To Storm Preparation

By Charleston County Area, SC Project Impact and
Boat U.S. Marine Insurance Damage Avoidance Program

Developing A Plan

Decide where your boat will best survive a storm and what protective steps you need to take before hurricane season. If your boat is in a marina, check your dock contract for language that requires you to take certain steps or depart the marina when a hurricane threatens. Also find out if your marina has a hurricane contingency plan.

Know What to Expect

Preparing a boat for a hurricane means defending against wind, rain, waves and high water.

SURGE

Storm surge accounts for much damage because it puts docks and dock-line arrangements underwater as boats try to float above. Surge raises the water level as much as 10 to 20 feet above the normal high tide, cutting off roads, forcing evacuation and lifting boats above their docks and pilings. Surge-influenced high tides can reach 20 to 50 miles from the storm's center, making extra length and positioning of dock-lines critical.

WIND

Hurricane wind speeds of 70 to 130 mph are common, and gusts over 200 mph have been recorded. When wind speed doubles, wind pressure quadruples. This illustrates the need to reduce windage (the surface area your boat presents to the wind) by removing as much rigging, canvas

and deck gear as possible, and pointing the bow toward the greatest anticipated exposure.

WAVES

Hurricanes can produce steep, breaking waves 3 to 6 feet high that pound normally peaceful harbors. Sea walls, barrier beaches and other structures designed to protect docks and moorings may be submerged by storm surge. This has the effect of greatly extending the "fetch," or distance, over which the wind can generate waves.

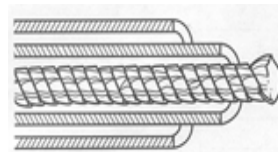
RAINFALL

Rainfall of 6 to 12 inches within 24 hours is normal during a hurricane, with recorded extremes of 24 inches. Cockpit decks are seldom 100% watertight, and the ability of a bilge pump and battery to handle rain accumulation is greatly overestimated. Deck drains and pump discharges located near the water line can backflow when waves and rain put drains underwater.

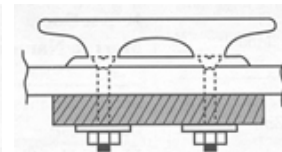
BRIDGES CLOSE

When storm winds reach 25 mph, the U.S. Coast Guard issues an advisory that all area bridges may soon close to marine traffic. When sustained winds reach 35 mph, the Department of Transportation orders every bridge in the affected area to be locked and closed down.

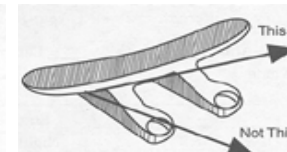
Critical Points



Using a polyester line from the cleat through the chock, secured to an existing nylon line to the piling or mooring, gives you better protection from chafe, while also absorbing shock. Make eye splices in both lines with at least five tucks.



A properly backed cleat: Note the washers and the backing plate. These are essential in a hurricane and a good idea in quieter times as well.



Lines led perpendicular from a cleat can wrench the cleat out of the deck. Two-hole cleats are more vulnerable than four-hole cleats.

Chafe Gear

Chafe protectors are essential on all lines as winds and high water works them against chocks and other contact points. On moorings or at anchor, lines stretched over the rail can create sufficient internal heat to melt them. Polyester (Dacron) stretches less, but is much more chafe resistant than nylon. Using a polyester line from the cleat through the chock and then joining it with a nylon line (using two eyes) to the piling or mooring provides the chafe resistance of polyester line and the stretch of nylon. Covering lines with hose or duct tape at the chocks greatly increases the degree of protection.

Cleats and Chocks

These are two of the most commonly neglected – yet strategic – pieces of equipment on your boat. This becomes woefully apparent when larger-diameter storm lines are brought into use during a storm. Installing additional and larger cleats and chocks during calm weather helps secure your boat year-round. Check your cleats to make sure they are backed properly with stainless steel or aluminum plates. Marine plywood is acceptable if it's free of rot and delamination. Securely backed winches on sailboats and even keel-stepped masts also can be used to secure lines at a dock. (Note: Anchor lines should not be secured to the mast as it increases the chance of chafe failure.) Two lines per cleat is a good maximum, and they should not be led perpendicular to the base, but rather at a smaller angle, to avoid wrenching out the cleat.

Reduce Windage

Strip all loose gear that creates windage: canvas covers, bimini tops, outriggers, antennas, anchors, running rigging, booms, life rings, dinghies, portable davits, etc. Lash down anything on deck that can't be taken off. Unstepping sailboat masts is strongly recommended when possible. If not, remove sails – especially roller-furling headsails which create substantial windage, particularly when they come unfurled. All halyards should be run to the masthead and secured with a single line to the rails to minimize windage and flogging damage to the mast. The line can be used to retrieve the halyards later.

Where to Keep Your Boat in a Hurricane

Securing a Boat Ashore

A Massachusetts Institute of Technology hurricane study found that boats stored ashore were far more likely to be saved than those left in the water. Some farsighted marinas and yacht clubs plan to pull as many boats out of the water as possible and secure the rest anytime a storm approaches.

Some boats must be hauled out to have any chance of surviving a storm intact, including smaller, open boats and high-performance power boats with low freeboard that most likely would succumb to waves, spray and rain. If possible, trailer your boat to safety. This does not necessarily include taking your boat when you evacuate - officials encourage taking as few vehicles as possible when leaving a storm's target area.

Store your boat well above the expected storm surge level. Rising waters can tip a boat off its cradle or jackstands, but there likely will be less damage sustained than if the boat is left in the water.

Reduce windage as much as possible and ensure your boat has enough support – at least three or four jackstands supported by plywood and chained together on each side of boats under 30 feet long, and five or six stands for larger craft. To reduce windage, some sailboat owners have dug holes in the ground for their keels. Smaller sailboats were laid on their sides. High-rise storage racks are vulnerable in high storm winds. If possible, boats on storage racks should be placed on trailers and taken home.

Securing a Boat in the Water

Boats left in the water should be secured in a snug harbor, but storm surge with its rapidly rising water is a major consideration. High waters of 10 feet or more are common in a hurricane, so a marina's seawall or a sandy spit that normally protects boats may offer no protection.

Avoid crowded, rocky-bottomed areas to reduce chances of other boats breaking loose and banging into yours. Rocks also are hard on a boat if it breaks loose and runs aground. Extreme gale winds can blow the water out of a safe harbor or cove, standing boats briefly, so your boat would be better off settling on anything but rocks.

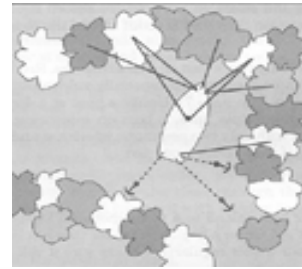
Check your charts for the best bottom to anchor in – sand, followed by clay, hard mud, shells, broken shells and soft mud. A paint job is less expensive than repairing a cracked hull.

HURRICANE HOLES

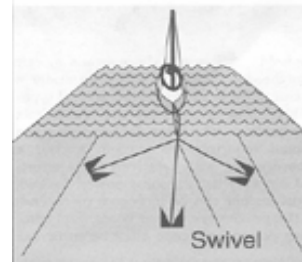
Hurricane holes are those canals, rivers and waterways that offer safe shelter and alternatives to crowded harbors and marinas. Your mooring arrangement will depend upon the nature of the area you choose.

A boat in a narrow canal should be secured with several sturdy lines from its center to both shores in a spider-web pattern. The boat should face the opening of the canal and be as far back from open water as possible to get the best protection and help leave the waterway navigable.

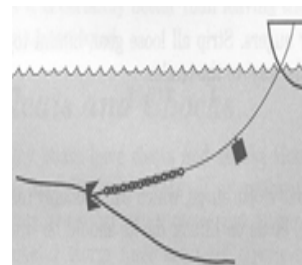
Also make sure you have permission from the owners of the tree on private property you intend to use in securing your boat. You might be able to help them and other boat owners along the canal tie off their craft and prevent that one boat from breaking loose and wreaking havoc with yours and others.



One boat that survived Hurricane Andrew was secured in a mangrove channel with 5/8" lines to shore and three large anchors; a 60-lb. Danforth, a 37-lb. Fortress; and a 45-lb. Bruce. Each of the lines had 10' of slack to allow for the tidal surge



Using three anchors set 120° apart allows the boat to swing and face the wind. This is an especially good technique if the boat must be moored in a crowded harbor because the boat will not swing in as wide an arc as a boat that is riding on two anchors.



Using a weight (sentinel) on the rode can lower the angle of pull and help reduce the jerking motion.

MOORING AND ANCHORING

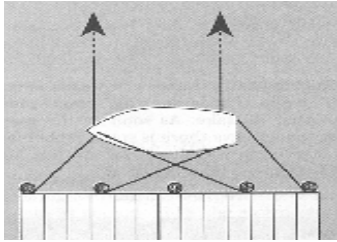
Mooring in a sheltered location is another alternative to exposed harbors and crowded marinas. A moored boat can swing to face the wind, reducing windage, and is less likely to be slammed into a dock unless the anchor or mooring drags.

While an anchor's holding power can be multiplied by extending the pennant's scope, you have to consider the proximity of other craft. Scope length also must allow for a tidal surge – at least a 10:1 chain-to-line ratio with a lot of heavy oversized chain. 50/50 is probably the optimum set-up. Dragging also may be reduced by using one or two additional storm anchors to improve holding power and decrease the amount of room the boat will need to swing. Successful arrangements include two anchors – or an anchor and a mooring – set at 45 degrees apart, and three anchors set at 120 degrees apart and joined at a swivel.

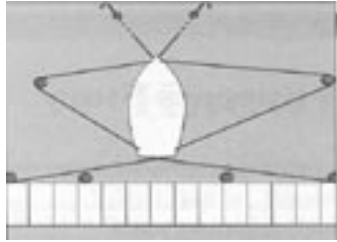
Placing a riding weight, or sentinel, at the juncture of the chain and line lowers the angle of pull on the anchor and reduces jerking and strain on the boat. To absorb shock, an all-chain rode must have a snubber (usually nylon line) about 10 percent of the rode's length.

Test studies show that the “embedding” type anchors – a helical and expanding fluke anchor screwed or driven into the bottom – are the least likely to drag. Moorings such as the mushroom anchor and deadweight blocks dragged with relatively little effort.

AT A DOCK



On a face dock, position the boat farther (the farther, the better) than usual from the dock and add offshore lines to hold the boat away from the dock. Offshore lines can lead to distant pilings or trees, such as across a canal, or to anchors if the bottom provides adequate holding.



A sample storm arrangement: note the spring lines, which were the longest lines, are now the shortest. Stern lines are extended one or two slips away. Additional bow lines lead across to the next dock or to storm anchors placed out from the slip.

Larger, longer lines that are properly arranged and protected from chafing increase your boat’s survivability. Storm weather docking arrangement should leave your boat looking like a spider in the center of a large web, allowing the boat to rise on the surge and be tossed about by the storm, yet remain in position.

In most cases, the bow should face open water or the least protected direction to reduce windage. Use surrounding trees, pilings and dock cleats to secure dock-lines. While lines should be taut to keep the boat away from pilings, they should be at least as long as the boat to accommodate the surge. Work with slip neighbors and marina management to use each other’s pilings.

Floating docks allow boats to rise with the surge if the pilings are tall enough – at least 18 inches above mean high water. Shorter pilings present a greater chance that docks and boats will be lifted over by the surge and carried away. Larger lines resist chafing and stretching. The following are recommended line sizes (thickness) for securing boats:

- 25 feet -----1/2-inch
- 25-34 feet -----5/8-inch
- 35 feet and larger -----3/4 to 1-inch

DAVITS AND LIFTS

A storm surge probably will reach higher than boats can be raised on backyard davits and lifts, so if possible, store your boat ashore. Otherwise, remove the drain plug so the weight of the accumulated water will not collapse the lift. Tie the boat securely to its lifting machinery to prevent the boat from swinging or drifting away. Plug the engine’s exhaust and strip the boat of all gear and attachments.

When To Take Action

A hurricane **watch** is posted when hurricane conditions pose a threat to a specified coastal area, usually within 36 hours. Waiting for a watch to be issued may be too late to head for the marina or move your boat to a safe location.

Even watching the barometer can’t tell you when to prepare for a hurricane. The extreme low pressure associated with a hurricane occurs close to the eye of the storm – too late to predict a landfall.

A hurricane **warning** is posted when sustained winds of 74 mph or higher are expected within 24 hours – too late to head for the boat. Securing your home, gathering emergency provisions and evacuating family members will take precedence at this point.

The best advice is to prepare or even move your boat when a hurricane is substantial possibility, even before a watch is issued. If you wait longer to relocate your boat, bridges may be locked down and the hurricane hole you choose may be inaccessible, or the marina staff may be too busy to haul your boat.

“The time for taking all measures for a ship’s safety is while still able to do so. Nothing is more dangerous than for a seaman to be grudging in taking precautions lest they turn out to have been unnecessary. Safety at sea for a thousand years has depended on exactly the opposite philosophy.”

-Admiral.Chester W. Nimitz

Never Stay Aboard

One of the most dangerous mistakes a skipper can make is to stay on the boat during a hurricane. There is little, if anything, a boat owner can do to save a boat when winds are blowing 100 mph, tides are surging and visibility is minimal.

When a hurricane is approaching, secure extra lines, set out anchors, add chafe protection, strip the boat above and below decks. Do whatever it takes to protect your boat, then head inland. Your boat can be replaced – you can’t.