

Damage Control: Saving the Boat When It Floods

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A sudden loss of steering led me to the worst sight of my life: Opening the engine room door, I found water halfway up the block of the main engine, and rising. In one terrible moment I realized what many a mariner has over the years—although I was equipped and trained to save myself and my crew, I was much less prepared to save my boat.

A combination of good luck and a couple of Coast Guard drop pumps saved the day for me, but many others are not so fortunate. The number of fishing-related fatalities has steadily declined since implementation of the Commercial Fishing Vessel Safety Act, with its mandatory safety equipment and crew training—but the number of vessels lost has not. Damage control is the next frontier in fishing vessel safety.

Five distinct steps are involved in damage control: prevention, preparation, assessment, control, and temporary repair. This article will address preparation for an emergency, assessing the damage, and controlling flooding. The first step, ensuring total watertight integrity through design and maintenance, will be the subject of a future Boatkeeper column. Temporary repair, which means returning the vessel to a semblance of operational readiness, is not covered in this article.

This article focuses on flooding, leaving other possible sources of damage for later reports. Not only can it overcome buoyancy and sink a vessel directly, but equally important, flooding causes internal free surface and contributes to instability, which can cause the vessel to capsize, and exposes openings such as doors and vents to the prospect of downflooding and accelerated sinking. Preparation for damage control consists of thinking out the kinds of potential damage and possible sources of flooding, and planning responses to any eventuality.

Damage could include hull breaches caused by collision or grounding, flooding resulting from sprung planks or weld failures, chafed or split internal hoses or pipes,

failed through-hull fittings or seacocks, damaged or lost propeller shafts or rudder stocks, stuffing box or packing gland failures, or internal damage caused by shifting of cargo or unsecured machinery. Types of potential damage vary somewhat by vessel design and hull construction material, and contents of a damage control kit will likewise vary.

The Damage Control Kit

Every vessel has materials and tools on board that would be useful in damage control, if they can be located and reached in time of need. Rather than hope you'll have the right stuff where and when you need it, however, it makes sense to buy or assemble a damage control kit.

Kept all together in an easily portable bag, the kit should contain two or three waterproof flashlights, a hatchet or small axe, several screwdrivers, c-clamps, a small saw, and any or all of the following: duct tape, several sizes of hose clamps, twine, several sizes of tapered wooden plugs, soft wooden wedges, several sheets of rubber (inner tube strips) or rubberized cloth in

several sizes, assorted wire ties, grease tape, and Splash Zone Compound or other epoxy sealant that will set under water. Several good damage control kits are on the market, at prices around \$200-250. If space allows, stash a few two-by-fours, nails, and some sheets of quarter-inch plywood, precut to various sizes, when they can be easily located.

The damage control kit, like other emergency items, should be stored where it is easily accessible and up out of potentially flooded areas, and all crew members should be aware of its location and contents.

Assessing the Damage

Assessment of a damage situation consists of making a decision about the seriousness of the problem and figuring out where the water is coming from. The key difference between leaking and flooding is the ability of the pumps to remove the water; if ingress exceeds what is being pumped out, you have flooding, and that's a serious situation.

If a flooding condition exists, the next consideration is the danger of trying to

Damage Control Checklist

Preparation

- Think out all the ways water could enter your boat, including damage caused by grounding, collision or corrosion.
- Plan how to stem the flow in each case.
- Assemble a damage control kit with the materials needed for each case above. Stow it in an accessible location and ensure that all crew members know where it is and what it contains.

Assessment

- Is it leaking or flooding? If the pumps can't keep ahead, it is flooding, and dangerous.
- Ensure that all hands are prepared for a safe and orderly abandonment. Alert the Coast Guard of the situation.
- Determine whether it is safe to enter the flooded compartment and attempt damage control. If so, trace the source of the flooding.

Control

- Shut down genset and inverters. Disengage any machinery that may make working below hazardous.
- Jam any materials into the breach that may slow the flow of water.
- Back up with shoring or nail-on patching.
- Remember that water could come from an unidentified source or from several at once.
- Ensure patches are fairly secure before attempting to get underway, and maintain a watch.

stop it. Damage usually occurs under less than ideal conditions—darkness, rough seas, and loss of vessel control, for example. Most engine rooms and lazarettes are pitch-black inside as soon as the ship's power is lost. A couple feet of icy water in a sharply rolling boat sloshes with such force that it can tear bolted objects from the bulkheads, and can throw a grown man down. The skipper or engineer has to decide fairly quickly if it is simply too dangerous to try and save the vessel and the crew should simply prepare to abandon.

If it seems safe to attempt damage control, the next step is to locate the source of the water. In the case of a large hull breach, as in a collision, that may not be difficult; but if it's a through-hull that broke off or a garboard plank seam letting go, it could be difficult to locate, and of course there's a good chance it will already be under water by the time you discover you have a problem. In my own case, the symptom was flooding in the engine room; but the source turned out to be a broken rudder stock stuffing box. Chances are high that the water is coming from a location that cannot be seen or reached. If this is the case, your only hope is to try to isolate the flooding to one compartment so the whole hull doesn't fill. Watertight bulkheads will be addressed in the column on prevention.

Controlling the Damage

Control means stopping the flooding, or at least slowing it to the point where the pumps can keep up. Breaches below the waterline admit water very quickly. A five-inch hole only two feet below the surface pours more than 400 gallons (a ton and a half of water) a minute into your hull. At the same time bilge pumps do not remove it at their rated capacity (and they're usually rated by the hour, not minute), because debris clogs intakes and because pump ratings don't take into account vertical lift.

Assuming the damage can be located and it is safe to work, it's time to apply your ingenuity. First, shut off gensets and inverters to reduce the risk of electrocution. Then, jam rags, rubber sheeting, or pieces of cut-up raingear into small holes. Stuff a mattress or cushion into a larger one. Wrap a split hose or pipe with grease tape or rubber strips and secure with hose clamps, twine, or wire ties. In some cases, a plastic tarp, weighted on one side, can be lowered over a hole in the hull, where straps and water pressure will hold it in place to stop

the flow of water. Or a plywood patch can be nailed in place. Don't worry about it looking pretty, and don't even worry about it being permanent; its sole function is to stem the flow of water long enough for the pumps to catch up and to give you time to look for a long-term solution.

Plugs and wedges can be a sinking man's best friend. Cheap, soft wood is best because it can be split to fit into various size holes, and will compress when driven into a tight space. Unless the hole is a very regular shape, it will probably require several wedges and plugs to stop the flow. Every through-hull should be matched by one tapered plug, which could be wired to the fitting rather than kept in the damage control kit. Wrap a rag around the plug before driving it into place to help hold it there and to fill more space. Plugs and wedges may be cut off once in place to make them more difficult to dislodge accidentally.

In some cases, shoring may be required to keep patches and plugs in place, hence the two-by-fours stashed in the corner. But think fast: what else could serve to jam a patch in place? Maybe a table leg, a pike pole, or a piece of railing hacked out with the hand axe. Remember, looks don't count. Also, remember that holes normally above the waterline can suddenly become below the waterline. Sink drains and head discharges can siphon water into the boat if not plugged.

Regarding epoxy compounds: While well worth including in your damage control kit, they are really more effective for temporary repair, for two reasons. First, the surfaces being sealed must be absolutely immobilized because the epoxy can't bond to surfaces moving relative to one another; and it won't bond surfaces that are greasy or covered with rust scale, so the surface has to be prepared. Second, although the epoxy will set on wet surfaces and even under water, it takes several hours to several days to do so in cold water. By the time your Splash Zone sets up, you're no longer in a damage control situation; you're either already into the temporary repair phase or you're sunk.

If you have a damage control tip or a story about a successful (or unsuccessful) attempt to keep a vessel afloat, please contact me at Marine Advisory Program, 4014 Lake Street, Suite 201B, Homer, AK 99603, (907) 235-5643, or by e-mail at rftlj@uaf.edu. I'm compiling material for a more detailed damage control publication.

