

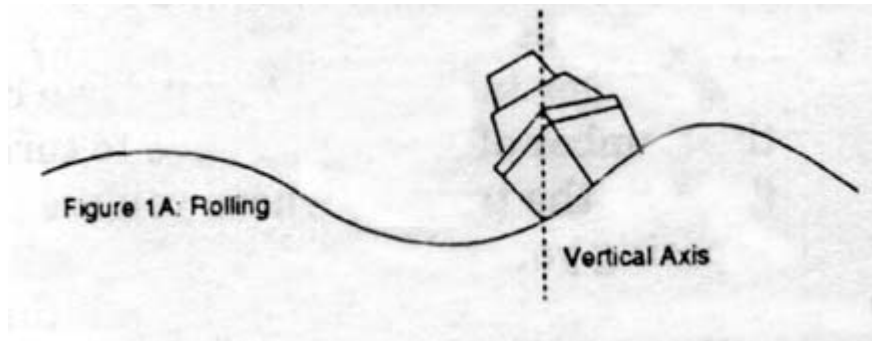


The Professional Captain

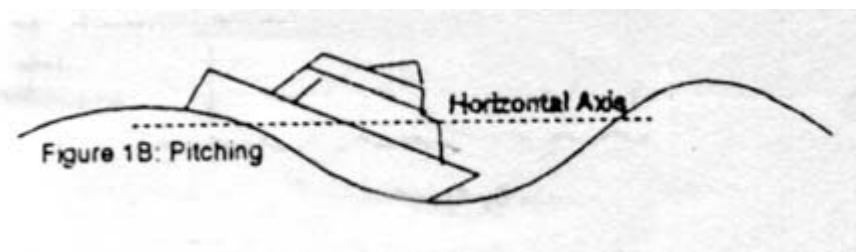
Boat Handling in Adverse Conditions Some Precautions and Steering Techniques Part II by Captain Don Fleming

Last month we discussed various precautions to be taken to avoid and to weather through adverse conditions and rough seas. We also analyzed the steering tactics involved in head on wave conditions. This month, as a follow up, we will discuss the steering tactics involved in adverse beam and following sea conditions.

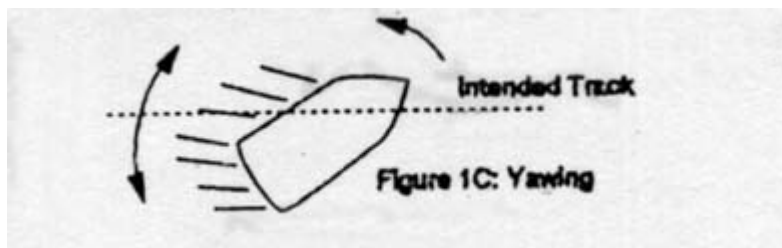
Let's begin by taking a look at the six possible motions a boat or ship is subject to while moving through the water: roll, pitch, yaw, heave, surge and sway. Rolling is the movement of the vessel from side to side. The boat rotates back and forth from its vertical axis as in Figure 1A.



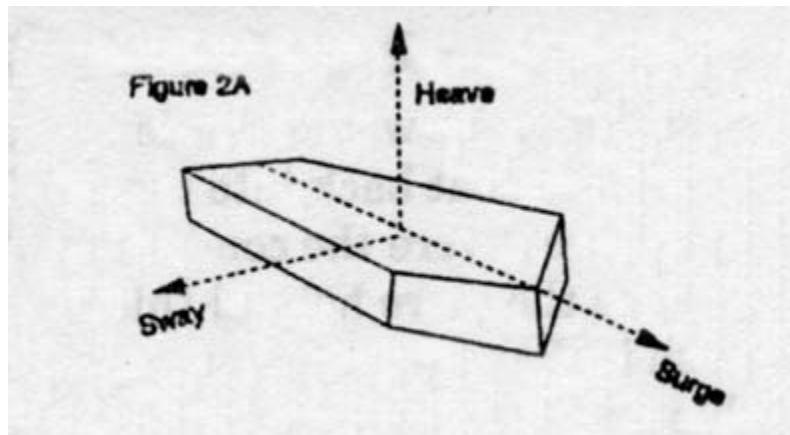
Pitching is the motion of the bow and stern rising and falling. As the bow drops below the horizontal plane, the stern rises and vice versa as in Figure 1B.



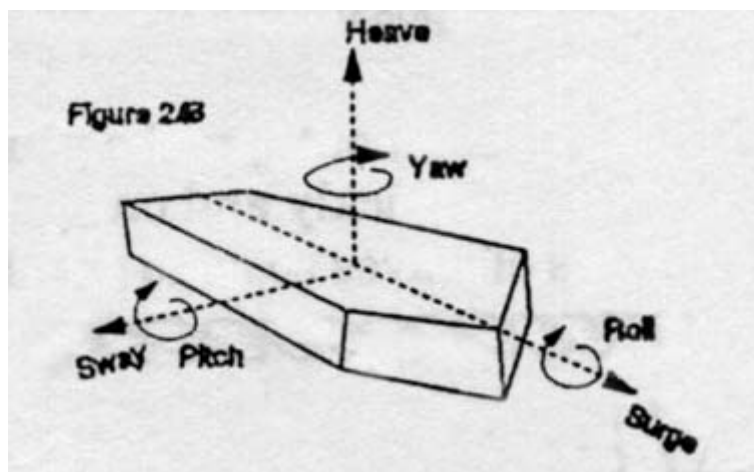
Yawing is the port and starboard motion of the boat that occurs when one sharply turns the steering wheel back and forth. The boat turns from left to right around its pivot point as in Figure 1C.



The other three motions heave, surge and sway do not involve any twisting movement whatsoever. Heaving is the lifting up of the entire vessel all at once. Surging is the sudden forward movement of the entire vessel, and swaying is the movement of the entire vessel sideways (See Figure 2-A).

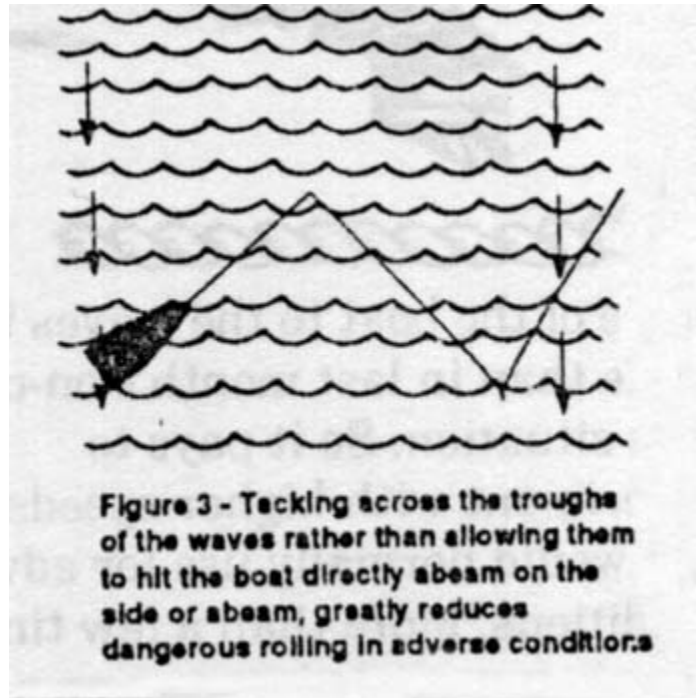


All six motions are combined together in Figure 2-B, and it doesn't take a rocket scientist to figure out that in rough seas all six motions are going on simultaneously



RUNNING THROUGH BEAM SEAS

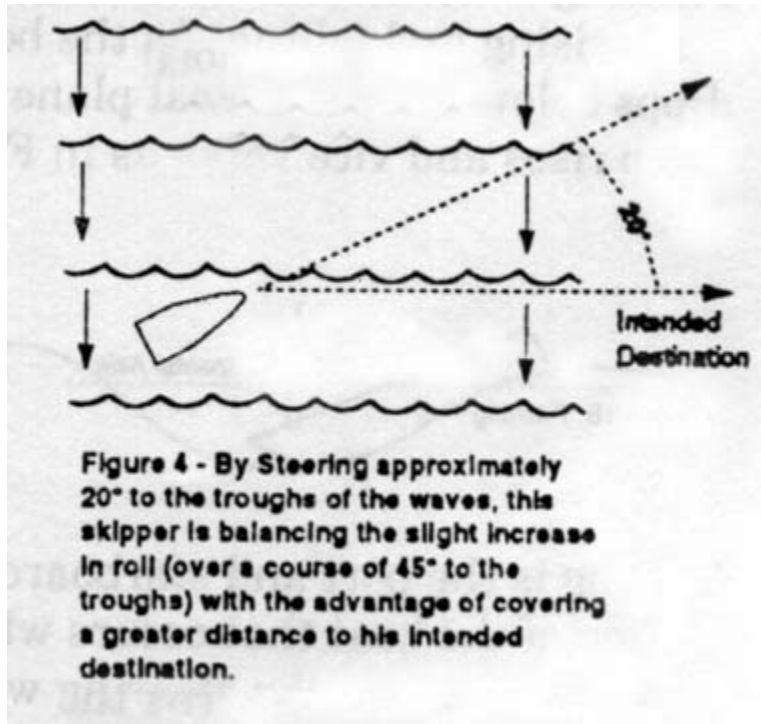
For all intents and purposes, the prudent skipper avoids running through severe beam seas whenever possible. This is due to the excessive roll caused by the waves directly hitting the side of the boat. In extremely severe conditions, the boat can be rolled completely over. The tactic to follow in this situation is to cut across the troughs of the waves in a "tacking" pattern similar to, but slightly different from the one described last month (See Figure 3).



As before, the most comfortable angle is 45° , but now you are first taking the waves on the bow and then crossing through the trough taking the waves on the stern quarter. Most skippers try to cut, this 45° angle down to perhaps 10° to the troughs of the waves or even less, balancing out slightly increasing roll with more distance covered to their intended destination (See Figure 4). One advantage I have found in less than totally severe conditions is that the speed of the boat can be kept up for longer periods of time because the angle of the boat to the waves is less acute than in last month's on-coming seas situation. So it pays to experiment with higher speeds than you would normally use for adverse conditions. More than a few times I have been able to keep up on a plane in this situation when at first I thought, it, would not be possible.

Also, in a twin screw boat when the waves are on the bow, it is often helpful to throttle up on the engine opposite the waves. Do this just before a large wave is about to hit the boat in order to give the boat a bit more push into the wave and to counteract the wave's tendency to throw the boat back into the trough. The more severe the conditions become the more helpful this extra push is. Remember however, to use this tactic only on the leg where you are steering up into the waves and not when you are running down with the waves. Using it while running down with the waves will only push the boat into the trough, increasing the roll and the possibility of a roll over.

As described last month, make your "tacking" turns quickly and on the smaller sets of waves so as to get the boat set up and stabilized on the new tack before the next set of big waves hits you. Also, it is better to plan to take longer tacks so as to cut down on the number of times you have to turn through the troughs where you are exposing yourself to a direct hit with a beam sea and the excessive roll that will result from it.



RUNNING WITH A FOLLOWING SEA

It is while running with a severe following sea that the most skill is needed. Here the motions of rolling, pitching and yawing can combine to allow a boat to get dangerously out of control. As the waves hit one of the back corners of the boat and lift it up, the props and rudders lose a great deal of their "bite" in the water. This results in less steering ability to counteract the yawing motion of the wave pushing the aft quarter over. If the bow gets buried in the trough ahead at the same time, then the boater can "broach" by yawing so severely that it faces the wave abeam more severely than those with less width in the transom, so it is impossible to give precise ranges of angles to steer down the waves by. The general strategy, however, is to take the smaller and medium waves on your quarter steering slightly higher than your intended course to your destination with the smaller seas and steering further on to your course in the medium seas. When the very large waves roll in, steer directly toward the path they are in. In other words, run more directly with the larger waves, and steer back to and above your course for the or broadside allowing the full force of the waves to roll the boat over.

The opposite extreme is called pitch poling. This occurs when the boat is running directly with the waves (the waves being directly behind). The boat falls off the face of the wave, the bow buries and the wave literally pitches the stern over the bow in a somersault motion.

Pitch poling is very rare, thank God. It has been known to occur in hurricane conditions where +50 foot waves have been known to literally throw a boat end over end. For the average boater the far greater concern is broaching. In the relatively shallow waters of some bays, sounds, and coastlines (the Nantucket Sound and the New Jersey Shore to name two prime examples), the seas can get very steep and the distance between the crests of the waves lessens as compared to the longer swells of the deeper water. In these conditions all it takes is 8-12 foot following seas for broaching conditions to exist for most boats under 50 feet.

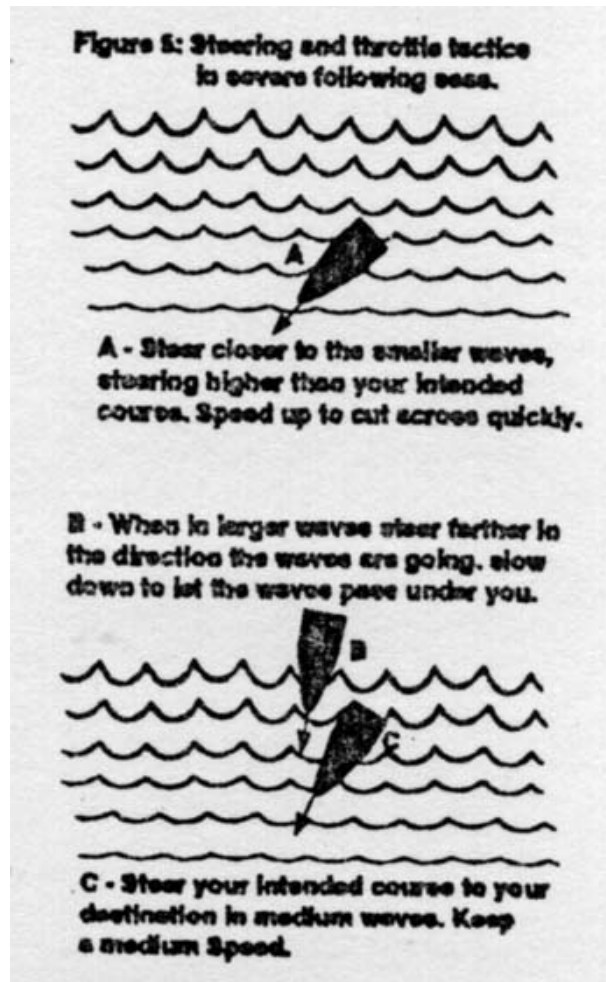
The basic strategy in these conditions is to reduce yawing as much as possible. First of all, get your trim tabs in the "bow up" position to let the stern squat down. Raise your outdrive/outboard trim 10° to 20°. Keeping the bow up is essential because it allows for greater prop and rudder "bite" as the waves pass under the boat. Second of all, reduce speed. In very severe conditions, run at the same speed as the waves, trying to ride in the trough as much as possible, with one wave breaking behind you and the other cresting in front of you. In extreme conditions tow a sea anchor or stream some wraps of line to help slow the boat down. The cresting waves coming up behind you can cause the boat to surge forward in an accelerated surfing motion. The sea anchor or wraps of line slowing the boat will allow the waves to pass under the boat and will greatly reduce severe surging and yawing.

As far as steering tactics are concerned, it will take some experimenting to find the proper balance between running directly with the waves and taking them on the quarter. Boats with excessively large beams aft tend to yaw much more severely than those with less width in the transom, so it is impossible to give precise ranges of angles to steer down the waves by.

The general strategy, however, is to take smaller and medium waves on your quarter steering slightly higher than your intended course to your destination with the smaller seas and steering further on to your course in the medium seas. When the very large waves roll in, steer directly toward the path they are in. In other words, run more directly with the larger waves and steer back to run and above your course for the medium and smaller sets. This zigzag motion through the larger and smaller sets tends to balance out to the course you have set to your destination, and it relieves a great deal of yawing.

Your steering strategy should also be combined with active throttling! As you steer up across the smaller waves, you can speed

the boat up considerably. As you steer down with the larger waves, ease back on the throttle to slow down and let the waves pass under you (See Figure 5).



You will find yourself moving your head back and forth constantly checking behind you for the larger seas and judging your angle to them and constantly checking ahead to check your speed and your course to your destination as well as keeping watch for other boats in your vicinity. It can be exhausting to say the least!

One of my favorite descriptions of handling a boat in extremely adverse following sea conditions comes from an unlikely source, Ken Kesey's novel *One Flew Over the Cuckoo's Nest*. It speaks of the power of the sea and dramatically describes the steering and throttling tactics I have been discussing. I goes like this... "We hit the bar and dropped into a canyon of water, the bow of the boat pointing up, the hissing crest of the waves going before us, and the rear down in the trough in the shadow of the waves looming behind us, and everybody in the back hanging on the rail and looking from the mountain that chased behind to the streaming black rocks of the jetty forty feet to the left, to George at the wheel. He stood their like a mast. He kept turning his head from the front to the back, gunning the throttle, easing off, gunning again, holding us steady riding the uphill slant of that wave in front. He'd told us before we started the run that if we went over the crest in front, we'd surfboard out of control as soon as the prop and rudder broke water, and if we slowed down to where that wave behind caught up it would break over the stern and dump ten tons of water into the boat. Nobody joked or said anything funny about the way he kept turning his head back and forth like it was mounted up there on a swivel. It is a good idea to practice these steering and throttling tactics in less than severe conditions in order to get use to the coordination that is required and to get the feel of how your particular boat responds. Remember to keep your bow high and try to get the feel for where your boat rides most comfortably in the following seas. Then, practice these steering and throttling tactics constantly keeping in mind that everything is designed to keep the boat from broaching. Training and practice will build your skill and confidence so that when truly severe conditions develop, you will be better able to handle them.

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