The Professional Captain

Boat Handling in Adverse Conditions
Some Precautions and Steering Techniques Part 1
By Captain Don Fleming

One of the most difficult and demanding situations that develops on board any boat is when the wind and seas build up to or beyond the maximum conditions for which a boat is intended. Proper preparation of the boat and crew, along with an understanding of the basics of boat handling under these adverse conditions can often times reduce a considerable amount of stress on the boat and crew, and can sometimes save them from disaster.

First of all, let's go back to the phrase "...the conditions for which a boat is intended." A tremendous amount of trouble can be eliminated right here. Obviously a boat that is designed to operate in the protected waters of rivers and bays is not going to handle well offshore, and the prudent skipper will recognize the limitations of his own vessel. Also, careful monitoring and observation of the weather via NOAA. Weather Radio and visual checks of the sky around the horizon are obvious points. Probably, more people get into trouble in adverse conditions because they do not allow for a flexible float plan that can be adjusted for deteriorating weather conditions. They feel they must push on to the next scheduled port of call when they know deep down inside that the smart thing to do is to stay put until the weather passes.

In spite of all sensible precautions that can be taken, however, sooner or later the law of averages is going to catch up to each of us and we'll be "caught in a blow." Sometimes winds can reach hurricane force during severe thunder squalls, and, on occasion tornadoes have been known to sweep across the region. The often devastating winds the seas they produce are, however, primarily of relatively short duration, perhaps fifteen minutes to one half hour. Keeping this in mind helps a great deal in planning a strategy and in keeping the panic level down. Other types of storms can be, of course, of much longer duration and of equal or less intensity.

The key to "weathering through" these adverse conditions is to keep calm and to prepare. Seek shelter whenever possible. If a marina or harbor is unavailable, the next best bet is to get under the protection of the leeward shore. In the Hudson River, this is often the western shore, as many of our thunderstorms come from the west and southwest. Ducking in under the protection of the cliffs, or better yet into a cove and either anchoring or "heaving to" are much better than trying to "slog it out" trying to make it to your home port. When anchoring, keep the motor running, and as the wind rises take some of the strain off the anchor line by putting the boat in forward and easing up on the throttle. Be careful, however, not to develop slack in the anchor line as this can cause the line to wrap around the prop(s).

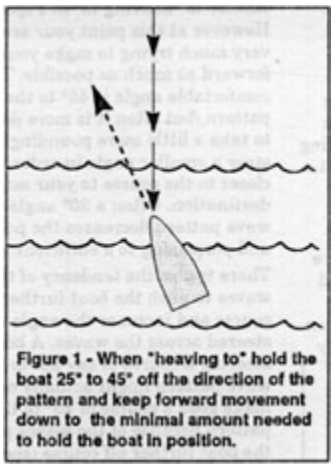

Figure 1 - When "heaving to" hold the boat 25° to 45° off the direction of the pattern and keep forward movement down to the minimal amount needed to hold the boat in position.

When "heaving to" keep just enough forward headway on to keep the boat angled off the direction of the wind by 25 to 45 degrees (see figure 1). It's OK if the boat slips sideways or backward somewhat as long as you have room behind you. The idea is to relieve as much pressure on the boat as possible by moving forward as little as possible, use the power to hold the boat head up into the wind and seas at the proper angle. This technique is also highly recommended in deeper water and very rough seas when going forward on your course is no longer possible.

Preparing for Rough Seas:

In preparing for high winds and rough seas some precautions should be kept in mind. While it is impossible to make a complete and thorough list because of individual boat differences and the great variety of weather circumstances, here are some basic considerations:

Secure all hatches, doors, windows and ports. Secure all loose items in the interior.

Pump the bilge's dry and keep pumping them dry at regular intervals. Water flowing around in the bilge's will effect the boat's stability, as well as scare the hell out of the crew when it comes sloshing through the floor boards and hatches. Assign a crew member to check them regularly to do the pumping.

Stow away all loose gear and lash down any large items that cannot be stowed. Be sure to assign a crew member to check all lashings at regular intervals for wear and chafing, and to replace or reinforce as necessary.

Break out your life preservers and inform your crew that everyone will be putting them on well in advance of their necessity. This will help to keep them from panicking, which often happens when you wait too long and the donning of the PFD's is a perceived as the last step before disaster.

Break out emergency gear like flares and first aid kit, sea anchor, safety harnesses, etc.

Check your position and update your course as plotted on your chart. Prepare alternative routes to more protected areas. Often times it is wise to head for a more protected area even if it is some distance away. This way the conditions will be gradually improving as you proceed along.

If you think you will be in for relatively long haul prepare some hot soup, coffee or stew and slaw it in a thermos. Get sandwiches and other light easily digested foods prepared and stowed in a relatively accessible place.

Monitor your VHF radio via NOAA weather broadcasts, US Coast Guard districts calling channels 16, anti 33A. Also, reassure yourself by listening in on traffic between other boats in your area by switching up to the secondary channels. Keeping in contact with some of the boats in similar circumstances by sharing plans and information is helpful, but keep conversations brief and avoid unnecessary chatter.

Reassure your crew and guests by explaining your plans to them. Give each crew member an area of responsibility as this helps keep down panic and make each person feel part of the team.

Steering Techniques in Rough Seas

Now that we have discussed precautions and preparations, let's get into how best to actually handle the boat under adverse conditions. There are three basic sea conditions that must be considered: head or on-corning seas, beam seas, and following seas. We will now discuss on-coming seas and next month we will handle the other two.

The basic considerations in steering through steep on coming seas are to slow down to avoid excessive pounding and to approach the wave pattern at a reasonably comfortable angle.

Heading directly into the oncoming seas tends to increase the pounding and develop a “porpoise” effect where the seas will amplify the raising and lowering of the bow with increased intensity. Therefore, steering off at an angle is your first tactic. This is very similar to "heaving to" in Figure 1. However, at this point you are still very much trying to make your way forward as much as possible. The most comfortable angle is 45° to the wave pattern, but often it is more desirable to take a little more pounding and steer a smaller angle in order to keep closer to the course to your actual destination. Often a 20° angle to the wave pattern decreases the pounding and porpoising to a sufficient amount. There is also the tendency of the waves to push the boat further off course and increase the angle actually steered across the waves. A boat steering a course of say 20° to the wave pattern might actually only make good a course of 40° to the wave pattern because of the waves pounding the boat further off course (see Figure 2). What all this comes down to is to choose an angle that will keep you close enough to the course to your destination, but will reduce the excessive pounding caused by the rising seas.

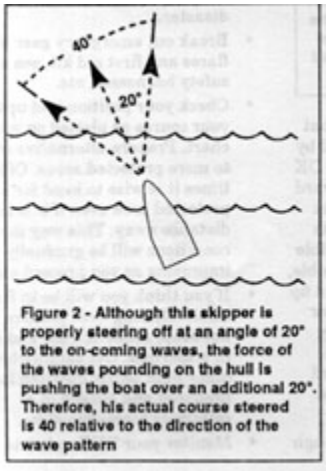

Figure 2 - Although this skipper is properly steering off at an angle of 20° to the on-coming waves, the force of the waves pounding on the hull is pushing the boat over an additional 20°. Therefore, his actual course steered is 40 relative to the direction of the wave pattern

Often when steering off at an angle like this, you will have to cross through the wave pattern and steer the opposite course on the other side of the pattern to zigzag or "tack" your way toward your destination (sees Figure 3). When turning or tacking through the wave pattern, it is important to wait for relatively calm conditions.

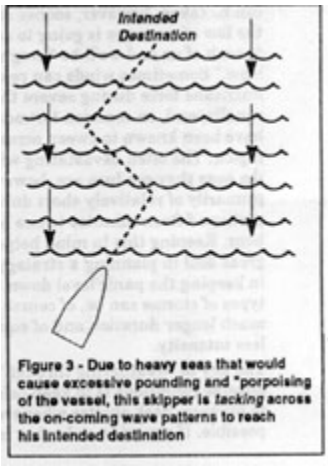

Figure 3 - Due to heavy seas that would cause excessive pounding and "porpoising of the vessel, this skipper is *tacking* across the on-coming wave patterns to reach his intended destination

The largest waves tend to travel in groups of three, with the largest wave last. After the large group, a set of smaller waves, perhaps three to seven will follow. Keep your eyes on the sets and make your tacking turn during the smaller set. Turn quickly and get the boat stabilized on the next angle before the next large set hits you.

As far as speed is concerned, you will want to drop down off the plane as soon as conditions worsen. This will be obvious as the boat starts to take excessive pounding. Most planning hull powerboats have a “dead zone” in their speed range between displacement speed when the boat is plowing through the water like a tug boat, and planning speed, when the hull actually lifts a few inches out of the water and skips across the tops of the waves. Typically a boat will reach top displacement speed at around 2000 to 2300 RPM, and it will begin to plane at 2800 to 3200 RPM. The "dead zone" is the speed between, typically from around 2300 to 2800 RPM.

In this "dead zone" the bow is raised at a steep angle and the motor is laboring to get the boat on a plane, but it does not have enough speed to lift the hull. Excessive amounts of fuel are also wasted when operating in the "dead zone". It is important to avoid operating in this dead zone under most conditions. This is especially true in rough seas, when the anxiety level tends to peak as the waves increase and the desire to use excessive engine speed increases with the anxiety. Therefore, slow the boat down to match the sea conditions and avoid the excessive fuel consumption and the excessively steep bow angle of the "dead zone."

Another problem that often develops as the waves increase in size is that the propeller(s) will tend to "race" as the oncoming seas pass under the boat and lift the stern. This has a frightening sound when first encountered, and can cause damage to the engine(s) if allowed to persist, but it is not a cause for panic. Simply slow down and perhaps angle away from the wave pattern a bit more.

Often an experienced skipper will vary his speed and angle with the size of the wave sets: slowing down and angling off for the larger set and then speeding up and narrowing the angle for the smaller set. By studying the wave patterns and practicing one can get in a very comfortable groove of synchronized movements that match the sea conditions.

Consideration must also be given to proper trim of the boat. Avoid allowing the boat to "plunge into" rather than "rise with" each on-coming wave. This can be caused by too much weight forward or too much "bow down" trim tab setting. Try to keep the bow down to some degree with the tabs, but allow about a 10° or 15° up angle at the bow so that the boat has some lift. If you over-do the trim in the opposite direction with too much weight aft or too much "bow up" trim tab your stern will be squatting down too low and the bow will be too high. The result will be that the on-coming waves will easily push the boat off course making it "fall off" to far, as well as making it difficult to control.

On smaller boats you can shift outboard engine gas tanks, anchors and other heavy gear out of the extreme ends of the boat. On larger boats, you can direct your crew to stay near the middle of the boat, and keep the number of people up on the flybridge to a minimum. In extreme circumstances you can tow a pail, a sea anchor or some long loops of heavy line behind you. This will not only help you to steer a steadier course by slowing your forward speed down, but it will also enable you to open the throttle more increasing your ability to maneuver. Be extremely careful not to foul your props) while "streaming wraps." You will be able to make a reasonable amount of progress by meeting each wave set as it comes and adjusting your speed and steering angle accordingly. Keep your eyes on the wave patterns so that there are not too many surprises. Keep encouraging your crew and holding them to their assigned responsibilities. Keep tacking and zigzagging your way toward your destination and remembering that moat severe conditions due to summer thunder squalls are relatively short lived. By following these techniques and keeping calm you and your crew will be able to "weather through" some seriously adverse conditions and have some great salty yarns to spin back at the dock.

Next month: Boat Handling in Adverse conditions Part II - Steering techniques in following seas and running inlets.

Captain Don Fleming is a licensed USCG Ocean Operator with over 25 years experience in sail and power vessels up to 100 tons in both the local area as well as ocean voyaging and racing from Maine to Grenada. He is well known throughout the area for hils hands-on training programs that range from close-wuartered docking and maneuvering to navigation, electronics and ocean passage making skills. He will answer questions addressed to Boating On The Hudson.
