

Following Seas

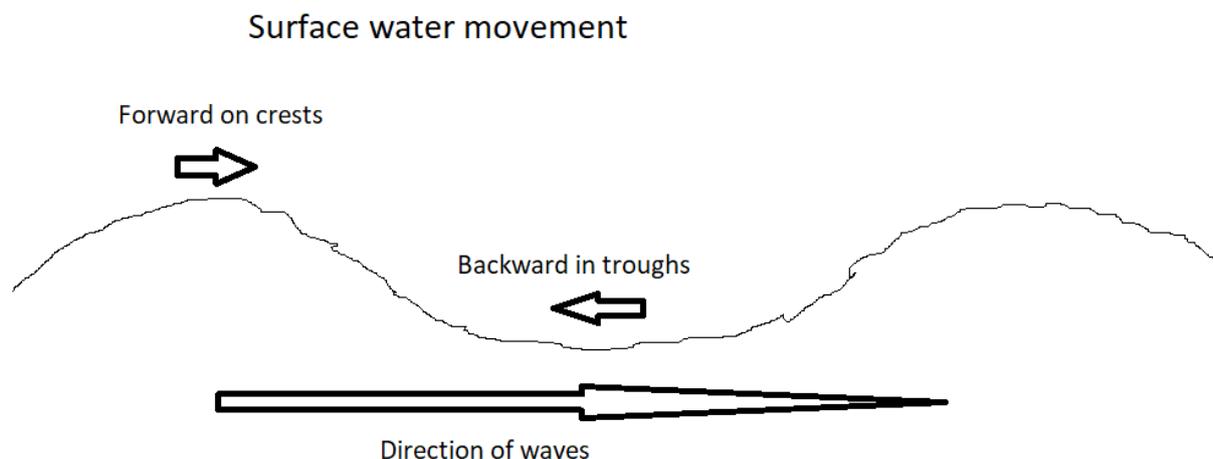
Handling a yacht in a following sea is very different from going into waves. This article discusses some of the difficulties that may arise and makes suggestions as to how they may be handled.

Structure of waves

Though it may appear that waves are moving water forward they are not except breaking waves or crests. An item floating in the water will be in the same position after a wave has passed*. The surface of the water does not however stay still throughout the passage of the wave so our floating object moves as follows:

As the wave approaches the surface water will move towards the wave
Then it will move up the wave
At the top of the wave it will be moving forward
As the wave passes it will move down to its original position.

The surface of the sea is therefore moving forward at the peak and backwards in the trough. As the waves get larger these movements of the surface will affect the yacht and its steering.



Wave speed

The speed of a wave in deep water is related to its length between peaks (wavelength):
Speed (metres / sec) = 1.25 x the square root of the wavelength. So for 50 metre wavelength the speed would be 8.8 metres / sec or about 17 knots. A 30 metre wavelength (very short) wave would still be travelling at about 13 knots. **In summary a following sea will be overtaking a yacht.**

Effect on the hull

When the stern of the yacht is on the peak of the wave it is being pushed forward. If you are lined up at right angles to the wave this will give the yacht a push. However, if you are at an

angle it will tend to push the stern forward relative to the bow i.e. start to turn the yacht broadside to the wave necessitating correction with the steering. The effect is more pronounced in short waves when the bow may be being pushed backwards by the movement of water in the trough while the stern is being pushed forwards which **can result in strong rounding up force to be corrected by the helm.**



Effect on the rudder

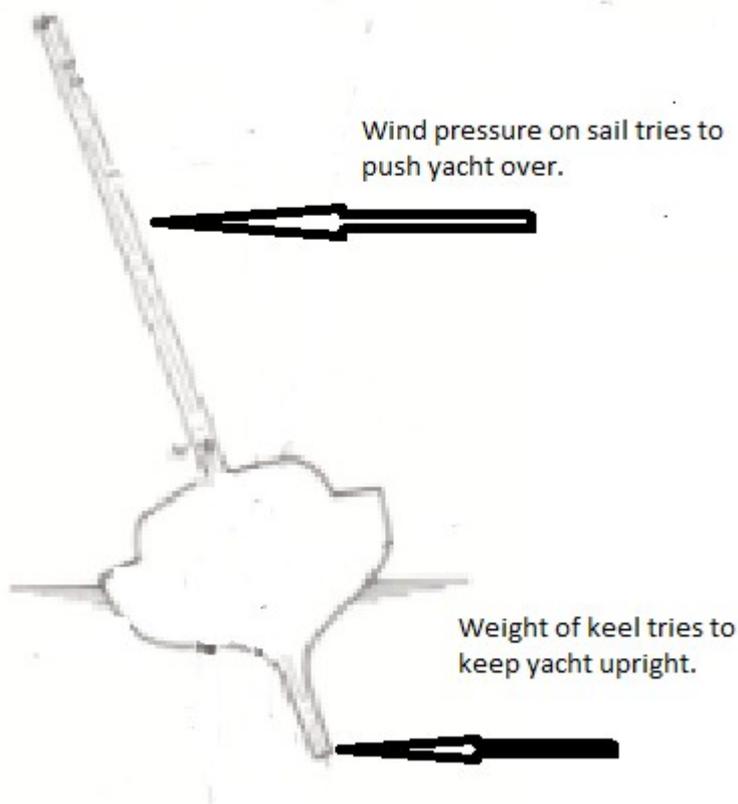
The turning force from the rudder results from the water flowing past it pushing it to one side when it is turned. Turning a rudder in still water has no effect at all. As the peak of a wave passes under the stern the surface water will be moving forward as is the yacht. The net effect can be that there is no flow past the rudder hence no control until it has passed. **The combined effect of the above results in the necessity for very large amounts of helm being required and often a delay before there is any effect.** Contrast sailing into waves when only small adjustments of the helm are required (unless of course you are overpowered).

Does it matter?

In small waves the above effects may hardly be noticeable but as they get larger they become more significant. Being repeatedly rounded up to broadside is not a good way to make progress, can give an uncomfortable ride and eventually become dangerous if the waves get so big or steep that they break.

Wind in addition to sea

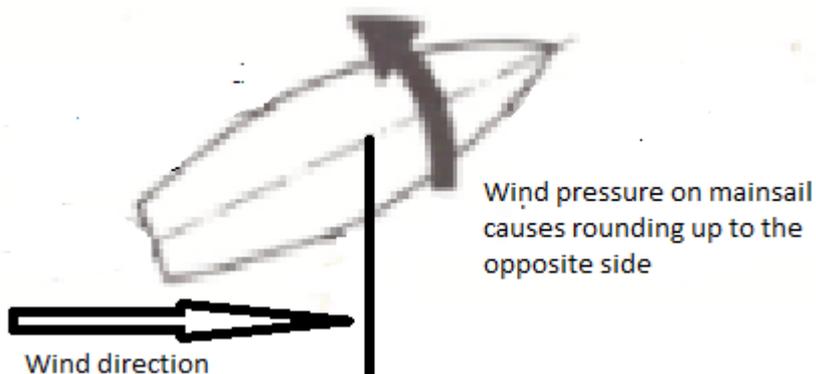
A following sea is usually (but not inevitably) accompanied by a wind from astern though often from a somewhat different direction from the waves. The behaviour of a yacht in with the wind from astern differs from that of a yacht sailing to windward. When a yacht is sailing to windward the pressure of the wind on the sails causes it to heel until that pressure is in balance with the force of the keel trying to pull the yacht upright.



The yacht is pinned between these two opposing forces though the balance changes with the wind strength and the yacht heels to a greater or lesser extent accordingly. The effect of this pinning is that the yacht does not roll when sailing to windward.

This effect diminishes the further the yacht sails away from the wind and dead downwind the yacht will have a marked tendency to roll. **If a yacht rolls excessively to one side the hull shape causes it to round up in the opposite direction.**

A further effect of the wind when sailing downwind with a mainsail hoisted is that it is set well out to one side of the yacht like a lever so **the wind pressure tends to push the yacht to round up towards the side opposite to the sail.**



Combined effect of wind and waves

So sailing downwind in a following sea we may experience:

A tendency to round up due to the yacht being pushed around by surface water movement

A tendency to round up due to the lever effect of the wind on the mainsail

A tendency to round up when the yacht rolls excessively to leeward.

The above can all happen at the same time and one may amplify the other.

In addition, the helm may be ineffective for a while as the peak of the wave passes under the stern.

Unwinding of the above forces can cause violent rolling back the opposite way then back again with the resulting danger of a gybe.

Noticing

Sailing downwind on a broad reach can be pure joy and long may it continue. During such times it's a good idea to look astern from time to time as conditions may look very different in that direction. Take note if the helm has made increasingly large movements of the wheel to hold the course. This may indicate you need to take action. Say you are creaming along at 7+ knots in 15 knots of apparent wind it may feel fine. If you have to round up to reduce sail you will discover the true wind of 22 knots but you will be sailing into it so the apparent wind may be say 26+knots! There are numerous accounts of epics in magazines that begin like that where if they had noticed what was happening a little earlier all would have been fine. Don't be lulled into a false sense of security.

Predicting

Waves described above were in deep water. **As the water becomes shallower the waves slow down, become shorter, steeper and more likely to break***. The same can happen when the tide turns to run in an opposite direction to the waves. Bear these effects in mind when considering action and maybe act early.

What can be done?

There are a number of strategies that can be adopted depending on conditions. Unfortunately some conflict with others so it is necessary to try things and judge what works best.

Hopefully, you will begin to notice early as handling problems start to appear and can start to try the following:

Rounding up a little and hardening the sheet will tend to make the yacht sail faster and less prone to roll. This may work but might mean that the stern is being pushed more by the waves and rounding you up broadside which you definitely don't want.

Conversely you might do the opposite in order to take the waves more from the stern which might minimise the rounding up but at the expense of more rolling.

Lining up to go straight down the waves is not a good idea as the yacht can tend to dig in in the trough and stop.

Try making adjustments to see if you can find an angle to the waves which works.

A skilled helmsman may take advantage by creative steering: lining up almost perpendicular to the wave and then rounding up somewhat to get a ride like a surfer before bearing away again for the next wave. This is hard work as well as skilled and more appropriate to racing than cruising.

The mainsail will be tending to round you up and will be in danger of gybing uncontrollably during a roll as well as blanketing the headsail. As conditions build it will be best to drop it entirely and sail on the headsail alone.

If you do find yourself overpowered downwind, roll away some of the headsail first. Then wait for a flattish bit of sea before rounding up smartly to a close reach sheeting in the headsail quickly as you do. Leave the mainsheet alone so the mainsail will completely depower and be ready to reef / drop.

Finally running the engine will give a flow over the rudder at all times and hence give control regardless of the position of the stern on the wave. This is often useful on the approach to a harbour as waves build due to shoaling water and there is less room for being pushed around by them.

* **Breaking Waves**

With breaking waves there is forward movement and a floating object will be carried forward – sometimes a considerable distance. Breaking waves in this context do not refer to white crests but to when a substantial amount of water and foam rushes down the front of the wave. Depending on the size of the wave relative to the yacht they can be dangerous and it is essential not to be caught broadside to one. The above strategies can be tried or various survival strategies, but the best option is to avoid them altogether. In the type of sailing we engage in the occurrence of such waves is often predictable and shown on the chart or almanac. They can occur in many harbour approaches and the Almanac may say something along the lines of: “do not enter in onshore winds of F4 and above or on the ebb.” Offshore areas such as the Portland or Alderney races (amongst others) are marked on the chart and times / conditions to avoid them made clear in the Almanac.

More problematic is swell which may occur with little or no wind (origin was maybe 1,000s of miles away) and might be hardly noticeable at sea. It can cause large breaking waves in shallow water which is great for surfers but not for you. The French typically report swell (houle), height period and direction and it is sometimes included in UK forecasts.

It is often possible to get advice of approach conditions by calling the harbour master and I think that the National Coastwatch Institute will also advise in their area.