

# Seamanship

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## Waves Upon, and Within, Waves

You've seen a few columns here about waves – the initial “Wave Theory” back in September '11, and then “*What Size Wave Can Actually Capsize My Boat*” followed in October, and then the column on “Wave Theory, Part 2”, this past February. Why is that? Well, waves are the sea's way of expressing its power. And it is that power which brings us through an inlet, over a shoal, or, to grief... Anyone who has stood by the seashore and watched the waves roll in must have wondered at least once, “when is the next big one coming?” And, sure enough, just out in the offing, you can see one that just seems head and shoulders above the others.

This column is about that.

## Traditions Die Hard at Sea

You've seen me make that observation before and it will always be true, by my reckoning. One of those traditions is that waves come in sets of seven, meaning that every 7<sup>th</sup> wave will be like the prior wave that passed earlier. Another way to think of that is that, once a big one has crashed ashore, the next one is but seven waves ahead.

## Do the Math

Of course, that isn't true – but it is sort of true, meaning that waves are part of a hydrodynamic system and there are statistical probabilities that do apply. One of the more quoted oceanographers in this regard is Walter Munk, who began the systemization of waves, weight heights and predictability (and measurement) of waves. He started his work during World War II and is still winning international awards and acclaim for his work in the field. Waves, or perhaps better said, “sets of waves”, are categorized by the “significant wave height” or  $H_{sig}$ .  $H_{sig}$  was intended to mathematically express the height estimated by a “trained observer”.

In oceanography, the  $H_{sig}$  is defined traditionally as the mean wave height (trough to crest) of the highest third of the waves. But once you do that, you start to tease out the statistics of waves of

varying heights arriving – and if you are a mariner out upon God's Great Sea, this can be of intense interest...

Now this can get pretty intense, mathematically, but if you focus on the message and not on the technology, you'll get all the information you need. Generally, the statistical distribution of the individual wave heights is well approximated by a “Rayleigh Distribution.” For example, given that  $H_{sig} = 1$  meter, or 3.3 feet, statistically:

- 1 in 10 will be larger than 1.2 m (3.6 ft)
- 1 in 100 will be larger than 1.5 m (5.1 ft)
- 1 in 1000 will be larger than 1.9 m (6.2 ft)

This implies that one might encounter a wave that is roughly double the significant wave height.

And remember what  $H_{sig}$  is – an expression of the highest 1/3<sup>rd</sup> of the waves. This means that 2/3<sup>rd</sup> are less than that. Perhaps lulling the mariner into a false sense of security?

Converting that distribution into time at sea, where a wave passes your 25' vessel, say, every 6 seconds, the table would look like this:

- 1 every minute will be larger than 1.2 m (3.6 ft)
- 1 every 10 minutes will be larger than 1.5 m (5.1 ft)
- 1 in 100 minutes (1.7 hours) will be larger than 1.9 m (6.2 ft)

And this is when 2/3<sup>rd</sup> of the waves are less than ~3'... And, statistically, when two significant waves come into “phase”, it is possible to encounter a wave that is much larger than the significant wave. So, if you plan on being out there fishing for, say, 6 hours, keep an eye on those “ $H_{sig}$ 'er's”... a few might come by with enough punch to tip you into the bait well, or worse...

## Well, What Happens “If..?”

We've all been, or all will, one day go out under beautiful skies and end up fighting our way home. “The best laid plans of mice and men often go awry”, as Robert Burns noted back in 1785... So, what do you do?

**Put Your Life Jackets On** – Right away, the skip-

per has to direct everyone to don their life jackets. On my vessel, I have a heavy weather/type-1 life jacket on the back of my helm seat. Across the back, where the crew can read it, it says, “If you see the captain put this on, try to find one for yourself.”

**Take Waves at an angle** – Those waves that you are trying to muscle through pack tremendous power within them. Did you know that 1 out of every 20 boats that sink at sea does so when the hull comes apart under the force of pounding seas? If that statistic was adjusted for heavy weather sinkings, it would go up dramatically, I'm sure. Cross the waves at a 45-degree angle and “tack” across the storm like a sail boat moving to windward. And slow down! Your 20 knots and 5 knots of wave speed multiply the force of the pounding. Slow down and divide the forces.

**Don't Be Bashful** – If things start to get dicey, get on the radio and call the USCG. Tell them where you are, where you are heading and why you are concerned about the situation. Most likely, the watch stander will take that information and ask you to check in with him or her every 15 minutes. Don't be late in checking in or you may find a red-and-white helicopter hovering over you. But if you are in trouble, the USCG will know where you were just 15 minutes prior. You started the “rescue starts now” clock the last time you communicated your position.

**Any Port in a Storm** – OK, you told your spouse that you'd be back by 4pm and it is now 6pm and you are struggling against the nor'easter that is keeping you from operating at speed to get in. Don't bet your life on a perceived deadline. Your spouse would rather you survive. Head to the nearest harbor you can safely make, even if that means turning and putting the storm on your stern. Arriving safely in New Jersey is better than not arriving at all.

**Surf** – If you find the sea is going where you are, consider getting on the back of one of those growlers and staying there, all the way home. It takes considerable seamanship and helmsmanship to ride the back of a wave but consider this. If you have an outboard engine with a transom cut-out, your “free board” is only that little distance between the water line and the lowest part of that cut-out. Probably 6”-10”. If you have a following sea and one of those growlers catches up with you, he will swamp you from astern. Stay ahead and he can't...

**Create a Ditch Bag** – If things really get dicey, don't leave the boat until it sinks out from under you. But have a “ditch bag” ready – cell phone, handheld radio, fresh water, dry clothes, medical kit, flash light, flares, etc come immediately to mind.

BTW, if you are interested in being part of USCG Forces, email me at [JoinUSCGAux@aol.com](mailto:JoinUSCGAux@aol.com) or go direct to the DISR Human Resources department, who are in charge of new members matters, at DSO-HR and we will help you “get in this thing...”

