

Sailing Wharram Catamarans in severe weather (March 2014)

SAILING WHARRAM CATAMARANS IN SEVERE WEATHER CONDITIONS

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16/05/2014



Don Brazier in the cockpit of his Narai Mk IV *Katipo*, sailing in the South Pacific.

For more information on Wharram Catamarans go to: wharram.com

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INTRODUCTION

First it needs to be said that many sailors go for years without having to cope with severe weather situations even if ocean crossing. Modern weather forecasting and the ability to obtain details when mid ocean via the SSB, ham radio or Satellite phone, and downloading weather faxes or grib files have improved the situation immeasurably. Setting out from shore with knowledge that you have a reasonable weather window is a far call from the days of Joshua Slocum.

If conditions become severe at sea, it usually means winds in excess of 40 knots and for smaller boats over 30 knots is often not so good. The length of time the wind has been blowing in one direction and the fetch will affect the height of the waves. The other factor is ocean currents – a wind against tide or current will create a bigger sea than may be anticipated. Estimating the height of waves when out amongst them is not easy, it is so much easier if you see another boat out there to give some scale.

No two situations can be exactly the same but in general the choices are to carry on sailing with shortened sail, heaving to, lying a hull, running off before the wind with no or minimal sails up usually towing a drogue behind the vessel or using a parachute sea anchor.

I have detailed in the following pages some accounts of Wharram Catamarans in such situations. It is quite a long tale – you may just wish to read the conclusions at the end! However, there is something to be learned from each of these experiences and the pleasing result is that all these Wharram Catamarans came through safely.

To some extent this is a work in progress and I would welcome other reports.

My contact details are at the end of the article.

I have listed the reports under the following categories:

1. Running off down wind
2. Towing warps or a drogue
3. Carry on sailing to windward
4. Lying ahull
5. Heaving to
6. Parachute sea anchors

1. CARRY ON SAILING RUNNING DOWN WIND

Captain Voss 38 foot *'Tilikum'*

Captain Voss the famous ocean sailor was one of the first to write about the dangers of running too fast down wind. He sailed round most of the World in his three masted, 38 foot (11.6m) sailing 'canoe' setting out in 1901. Although this boat was not a catamaran it is a story worth telling. It shows that the problems of sailing down wind have been recognized for years and it is a great description.

In his book he tells of departing Tasmania bound for Invercargill at the South of New Zealand and before long there was a gale.

"The wind continued blowing and the boat increased her speed as it got stronger. I took in one sail after the other until she was running under a mainsail only... In running with the wind and sea I could sit in the cockpit with the tiller in my hand, hour upon hour, and watch her going along.

Sailing of this sort is a pleasure.

It was four o'clock in the afternoon, the wind was increasing, and the seas getting larger. and I was thinking to myself about heaving to, when all of a sudden I heard the noise of a breaking sea coming up behind us... it turned out to be a bad one and the boat was not quick enough to raise her stern to the occasion, so the sea broke over us....after that reminder I hove to under sea anchor and riding sail....Apparently the Tilikum enjoyed it very much, raising her body over the large seas with almost as much ease as the albatross, of which an ample number swarmed around us”.

The sea anchor mentioned was a conical shaped heavy canvas structure four feet (1.2m) long with the mouth of the cone kept open with a galvanized metal ring with a diameter of 22 inches (56cm). Four lines were attached around the ring, and then they were shackled to the warp 150 feet (50m) long.

This structure was more of a size that would these days be called a drogue.

Voss' account reminds us how easy it is to run down wind, especially if you are heading in the right direction for your destination! Very often one does not notice the wind strength increasing until it is too late. If sailing to windward you have plenty of warning of deteriorating conditions as the boat's motion becomes more violent, spray starts flying and the decks are wet. Generally when running, if seas are not breaking, then conditions are not too bad. But running in big breaking seas can lead to surfing at maybe 15 knots or more in a catamaran, even under bare poles, and although Wharram Catamarans track incredibly well, things happen very quickly at speed.

Steering in foaming, breaking seas is not so reliable and there is always the possibility of broaching or burying the bows in the back of the wave ahead, even if you are not so unlucky as to have a sea break over your boat. Broaches happen more quickly the faster you go.

Before I first started ocean sailing I had imagined very long 'lengths' of breaking seas bearing down on your boat similar to waves breaking on a beach. But in fact the patches of breaking crests on each approaching sea seem more random. Sometimes you are picked up by a huge, steep sea that does not break, at other times the sea will break just as it reaches you and cause more mischief! So to some extent it is luck whether you avoid them or not. The greater wind strength the more areas of breaking sea.

The answer is to slow down and lessen the kinetic energy of your boat.

2. TRAILING WARPS OR A DROGUE

James Wharram, as described in his book 'Two Girls two Catamarans', has had good results towing tyres and chain on the end of a long warp.

Other commercial drogues are:

- the 'Sea-brake' <http://www.seabrake.com>, a conical device with flaps which open inwards under pressure,
- the 'Sea Claw' <http://www.paraseaanchor.com/seaclaw.html>,

- the 'Gale rider' <http://www.hathaways.com/galerider> ,
- the 'Jordan Series' drogue <http://www.jordanseriesdrogue.com> .

For Power & Sail



Fig. 1 Seabrake

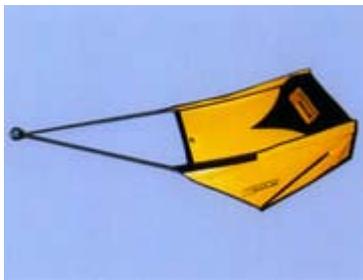


Fig. 2 Seaclaw

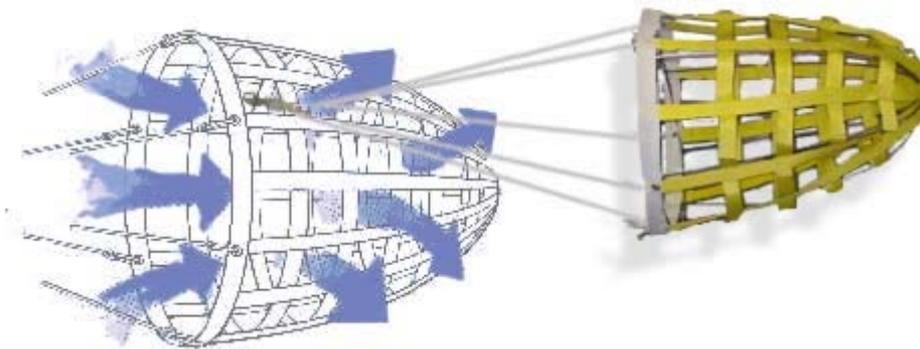


Fig. 3 Galerider

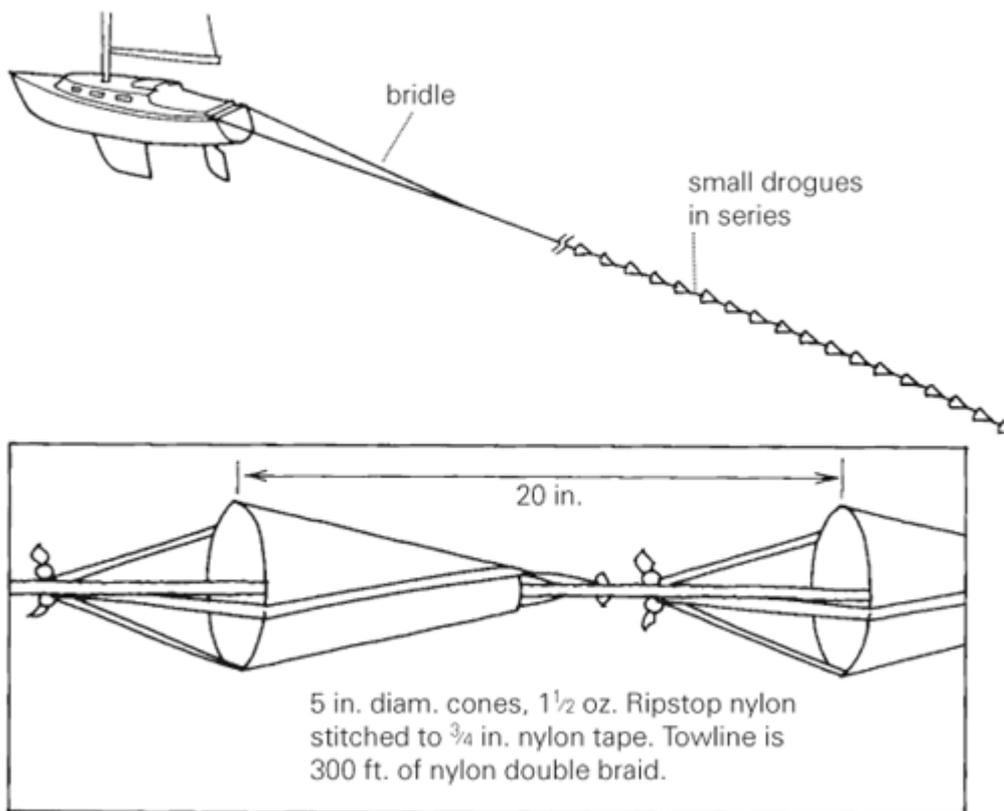


Fig. 4 Jordan Seadrogue



Towing warps on Tangaroa 'KM', while hand steering, when crossing the Tasman Sea in 1976. Ruth Wharram was aboard and took the photo.

George Payne, 36 foot Raka 'Raka'

George Payne who built the first 36 foot Raka, wrote a classic account of his experiences when returning with his crew of four after a race from England to the Azores in 1977. Ruth Wharram was aboard as crew and navigator. They experienced winds of force 9 and huge seas for 5 days and were surfing at up to 11 knots at times under bare poles. They were hand steering and put out from the stern a bight of warp with some netting threaded onto it enclosing 6 foot boards to slow them down which seemed to help a little. However he writes –

“Some time on Wednesday afternoon, two of us were sitting on deck, fortunately secured by harnesses, when we began to surf down a wave. The bow plunged in, and the following wave completely submerged us. This is the end I thought, Roy was swept against the mast. My next view of Raka was of it rising out of the water like a surfacing submarine – Oh joy what a boat! Not once did we feel she would capsize hull over hull but pitch poling seemed a possibility, although there is a theory based on Polynesian practices that fine sharply raked bows plunge through rather than are tripped up, when entering waves. It was not the time to theorize however, what should we do now? We could see our trailing warps were being washed towards our stern when these creamers swept down, so we streamed canvas buckets on 200 feet of line to get a grip on the wave beyond the one immediately threatening us. This did the trick although we continued South East at 2 to 3 knots”.

This emphasizes the need not to go too fast and also to have an adequate drag device on a sufficiently long warp. A hundred metres is probably a good idea.

He also mentions in the article the strain on the crew and exposure on deck with a blow that goes for several days.



36 foot Raka in Atlantic gale trailing warps, photos by Ruth Wharram



John Bellenger, 45 foot Oro 'Pyxis'

Pyxis meets her worst storm – reported in the May 1991 Sailor man magazine
John Bellenger built his **45 foot Oro** in Canada and sailed and lived on board for fifteen years. In this letter to the Wharrams he describes his worst storm yet en route from Sydney Australia to Tonga.

"We were overtaken by the mightiest storm that we were ever in, including the North Atlantic. Pyxis rode through it with comforting reassurance, ease and dignity, except for one wave which was upset by a rolling side wave and this swept the decks with several feet of foaming seas, moved a few fuel containers we had lashed to the decks – but passed almost immediately through the slats and out the large scupper holes. It only lasted three days but it seemed like an eternity.

On hauling in our 'Jim Brown' tyre drogue we saw that one of the three stainless steel cables on it was broken, a second was only holding on by a few strands! The third and last was quite frayed. (the drogue was a large tyre towed on edge with heavy ply in the centre hole).

Later as there was still a lot of wind with fully developed seas (we left only the tiny twin jibs up (4 foot luffs and just big enough to reach to the beam end) then we put the autohelm 3000 on and went to sleep – exhausted.....we cooked , slept, read and had a day off.

Much to our amazement the next day we had traveled 180 miles, this with nonchalance and careless ease.We have heard of several bad incidents in multihulls which set large chutes from the bows and got side on, because of rudder catching (like throwing a dart backwards ! Despite what has been written, we prefer the insurance of drogues and anchors rather than the paper kind

of insurance”.

Henk and Gini De Velde, 45 foot Oro ‘Orowa’

In Cyclone Oscar in the Indian Ocean in 1983.

Henk and Gini De Velde, along with their young son born in Easter Island, had been cruising round the World for the previous five and a half years. They left Christmas Island 19 October 1983 bound for Mauritius 3000 miles away and made good mileage in the SE trade winds. Six days out the wind was a steady 40 knots and Henk stayed up all night keeping watch, the windvane self steering coping well, a small jib drawing strongly. The next day with winds building and the seas moving humps of white water, they saw a a container vessel and learned over the VHF that cyclone Oscar had developed and was 200 miles to the North and moving towards them.

They cleared the decks as well as possible and lashed everything down. They were hoping to escape by running off to the West then North West (cyclones circulate clockwise in Southern Hemisphere). By mid afternoon “all hell broke loose ...the wind was getting stronger 60, 70 knots and more. It is difficult to estimate the height of the waves but they were surely 80 feet, the last 15 feet being light blue transparent foam. The wind was screaming so loudly that I imagined I heard human voices in peril. Twice the boat broached wildly, almost sideways onto the wind and sea. The bulwark washed away, everything tore apart. The deck came loose from the hull and the forward crossbeam broke....For 48 hours Henk was lashed onto the tiller with three ropes determined to survive. His pants were chaffed through, his hands bled and the inside of his arms were skinned, Orowa started to leak everywhere. The flexible through deck connections of the cross beams moved dangerously”.

Gini brought food and drink to Henk regularly. To their relief after 44 hours the wind dropped to around 50 knots and they raised a little more fore sail to keep ahead of the huge breaking seas. After 4 days total the worst passed and after a further 8 days they arrived in the atoll of Diego Garcia where they were able to rest and make repairs.

This experience is exceptional in that they were forced to continue sailing without towing a drogue under a storm jib to try and escape the cyclone’s path. Henk said:-

“According to the weather satellite station on Diego Garcia our course we must have been only 50 miles or so from the eye with winds up to 85 knots. I am a professional seaman (Dutch Merchant Navy, Master licensed) and used to the North Atlantic winter weather. Many times I have seen wind force 12 (62 knots) and gusting higher, but I have never seen such high and dangerous waves as this cyclone, and I hope never to see them again”.

Don Henderson, 50 foot Tehini ‘Coromandel’

Don Henderson who greatly enjoys sailing on his well built 50 foot Tehini *Coromandel* wrote to me from Savu Savu in Fiji concerning his worse experience:-

“The incident was in June 2002 and we were going North from New Zealand towards the

Kermadec Islands. The bad weather lasted three days with seas up to 50 feet and I guess the wind might have been 70 gusting to 90 knots at times.

We sailed with the weather, south then west and definitely hand steered, though there were 11 helmsman (several teenagers on board). In the day time everyone wanted to helm it was so much fun! I would like a parachute anchor, but sometimes when rough I just hand steer Coromandel into a stall mode in irons so as to speak, or hove to and it is very comfortable. Not this time, however, as the waves were like surf, giant surf.

I dragged two car tyres behind Coromandel on over 100 metres of warp. Without the drogue we would often touch 14 knots surfing. We could even still set the table with our crockery plates & cups to feed the hungry crew of 'gannets'

Coromandel suffered no damage what so ever. We felt quite safe and she always lifted to all waves, forward and behind. At the start as the weather deteriorated I stripped all 'delicate' gear off the decks, and stowed sails below. We changed our heading till we were most comfortable, which happened to be slightly off running directly with the seas. We didn't crash or bash under the centre pod much at all. It is 700mm above the water.

Beat Rettenmund, Tiki 38 'Aluna'

Aluna came through a really fierce weather system with winds up to 60 knots, on his way up to Tonga recently from New Zealand (August 2012) The worst of it lasted 24 hours. He had a fairly substantial system trailed from Aluna's stern, a bridle then 80 metres of nylon warp then a tyre and behind that a four foot diameter parachute drogue. He was short handed and crew sea sickness did not ease the situation, the tillers were lashed. The expectation was that the stern would be held adequately into the seas while they sheltered below decks, but Aluna would fall off, lie beam on and breaking crests would shake her violently at times.

However James had designed her well and Beat had built her well – she came through to their relief unscathed.

Beat vividly describes when he was in his berth during the storm :-

“After some hours of chaotic and ruthless darkness I must have slumbered off eventually because so vividly I still remember waking up suspended a foot or so above the bunk's padded surface, my body one second later plunging down hard onto the mattress and then being showered with the dozen or so books that I had piled back onto the shelf beside me before crawling into bed. Strangely enough I also clearly remember the second or two before that when the hissing sound of an approaching breaker ramped up its acoustic volume steeply before it hit us with such violent force that shook Aluna violently back and forth three times.

Now clearly all bets were off and the possibility of something going very badly wrong had become a pressing reality.....There was no more slumbering for the rest of the night. I rode up every wave and slid down every trough with a crystal clear awareness of the boundless power of chaos and with the absolute presence of a soul suspended in a ruthless limbo between life and death. The hours slid through the darkness with unperceivable sluggishness. The howling hum in the rigging continued unabated. Two more breakers shook Aluna to the very core of her ancient Polynesian ruggedness.

Finally, finally towards the early morning hours the fury started to ease.....and when daylight had broken I dared to peek out of the companionway, expecting to see things torn to shreds on deck. Amazingly everything was in its place, dripping wet but safe and sound. The sea was still

tumultuous, heaving at us from all directions, but the sky had cleared”.

After the storm on hauling the drogue back on board it was found that the material of the drogue had become tangled in a packing line and it had collapsed. Beat has a blog, to read more of his experience in the storm and of his voyage see <http://alunaboat.wordpress.com/2012/07/14/how-low-can-you-go/>





Tiki 38 'Aluna' in storm

Mike Lynn, Pahi 42 'Mother Ocean'

Mike Lynn when crossing the Atlantic in 2010 on 'Mother Ocean' towed a bight of 50 metres of warp in the Atlantic with good results in 5 days of force 9 gusting force 10 – see <http://wharram.com/site/node/3740> . They hand steered all the time. Before putting out the warp they had surfed at times at 14.7 knots under bare poles.

Ted Vitale , 35 foot Tangaroa 'Los Dos'

The most fierce wind I have heard about was from a fellow sailor Gary who reported:-

"The boat was a nice 35 foot Tangaroa named "Los Dos" skippered by Ted Vitale. The year was 1984, and a hurricane off Baja California. He had had 20 boats over the years including monos, tris and cats and after the hurricane he said the Wharram was the best boat to have been on in a hurricane.

He left Cabo heading for Magdalena Bay, about 150 miles north. He figured that if the hurricane caught up to him he would get enough wind to stay ahead of it and get into shelter, but it overtook him so fast all he could do was run downwind which in this case was west. As the hurricane came north between him and the land he had to head south and then back east, basically sailing around the storm dragging every line and anchor on board and letting the windvane steer while he stayed

inside. He said it was like sliding down big white hills. Everything was white and he couldn't face into the wind. He was in it for about 24 hours and the next morning he spoke to a ship on VHF that had been in the same area and said they clocked 100 knots."

Dave Vinnicombe, Tiki 38 'Dragon'

Dave made a very successful voyage in 2009 from South Africa to New Zealand via Panama. I asked if he had any breakages, "only one coffee mug" was the reply!

He favoured using a Jordan serial drogue and wrote:-

"I used the Jordan drogue in anger off the Columbian coast one night. It is a heavy bit of kit weighing about 50kg with its long length of rode and bridle. I didn't attach it well enough to the aft stern tube and when it did come under load the loops slipped off the ends of the tube and it was lost!! As Dragon was now doing 7kts under bare poles with the clouds showing more wind to come and the seas building, plan B was to use my spare anchor rode as a warp in a bight off the stern tube. This comprised 50m of nylon, 15m of 8mm chain. I added about 15m of line to the chain end and secured it all well to the stern tube and eased one end of the line into the water and payed it out. Very easy to rig and deploy.

Dragon slowed to about 2 knots. I set the wind vane to help steer down wind. Then made a cup of coffee and watched the show. Apart from the noise, the motion was easy and Dragon rose to breaking waves, her canoe stern acting like a bow and breaking waves passed beneath on their way without wetting the decks!

Next morning the wind eased to 30 knots and I recovered the drogue by simply pulling on one end till it all came aboard. I was able to flake the rode as it came so making the tidy up easier.

In Panama I saved a tyre to slide down the rode as an extra drag if I ever needed it. One night out of the Marquesas things got really nasty and I deployed the 'anchor rode drogue' again, without using the tyre. Again the result was a quiet ride (compared to what was happening before) with Dragon riding the waves stern too very comfortably. The seas were confused and we got the odd beam sea which broke against the hull. But Dragon rode it out well and the next day when the seas became sailable again the recovery was easy.

I was very happy with this system particularly as I was single handing with my wife. I am not a brute of a man (I am 52 weighing just under 70kgs, you get fit and slim sailing!!) and I had some reservations about how easy it would have been to recover the Jordan drogue in 25kts. The anchor rode drogue was well within my capabilities.

Because a Tiki 38 is light, she needs a system to slow her down and when the wind goes over 30 knots for a protracted time, with a building sea, it's wise to start thinking about storm management. It has to be simple quick and easy to deploy and recover. This system is and gives a good degree of comfort to know that you can calm things down easily if you have to".

Rory Mc Dougal, Tiki 21 'Cooking Fat'

During his round the world voyage 1991-97, Rory ran off towing a drogue with windvane steering off the Eritrian coast:-

"I loved using the drogue when necessary. It worked a treat for keeping Cookie under control as she wanted to surf in any winds above 30knots, even under bare poles!

I found I could sail Cookie effectively with wind on the quarter and still use the drogue as needed. I remember running up the Red Sea off the coast of Eritrea. I had been hand steering to use the best stern winds for 18 hours and really needed rest but was worried that Cookie might slew off course towards the coast 10 miles away. So I put out the drogue and she self steered a very accurate course all night giving me good confidence to get sleep. The drogue slows Cookie down to about a 4 knot average and stops any surfing. In 30knots I increased sail to full working jib to give steady pull against drogue. It is easy to deploy and recover as needed. I used a conical tube like a windsock, made of dinghy hypalon material. I used my regular anchor rode of 5metres of mm chain and 14mm nylon warp. The chain helps to keep the drogue weighted down from the surface and I never had a cavitation problem”.

Rory has reported running with a drogue and using wind vane steering even in 55knots of wind.



Tiki 21 ‘Cooking Fat’ just after arrival in the UK on return from the single handed Jester Challenge in 2010. Note the minimal accommodation and windvane steering. This is the smallest catamaran to have sailed round the World.

Glen Tieman, Pahi 26 ‘Peregrine’ and later Tama Moana ‘Manu Rere’

“I agree with James Wharram that running with drogues is about as safe and comfortable as can be but has limitations. The ones you mention about requiring searoom. Another one for me is that I have to be able to carry some sail to do this for the sake of self steering because I use sheet to tiller. When I left Costa Rica bound for the Marquesas a few years ago I sailed right out into a Papagayo which is sort of a southern branch of a Tehuantepecer, and famous for intense steep

seas. This is the only time I've ever seen waves offshore which had breaking crests that were the top ten feet of the seas instead of only the top meter. They broke with a powerful concussion leaving spume a couple of feet thick over broad areas. I ran with drogue and did fine but during the worst night I took down the mizzen and used only a small mainsail which meant I had to hand steer. With a wind vane or autopilot, or crew hand steering, running with drogue would work in very high winds under bare poles, for long periods.

... it would not hold the stern up without (self)steering control not even with a jib sheeted flat on the boat's centerline. It was a great technique though for improving control while still sailing. I kept the drogue rigged up and stowed in the tender on the stern net so it could be just tossed overboard.

Drogues should be used more by multi-hullers. Far and away the biggest issue when running down the trades is the tendency of all boats to round up in following seas. A boat going fast rounds up faster which at some point self steering can't cope with. This is a cruising issue - racers hand steer in order to go as fast as possible. I use just a fathom or two of chain on a stern bridle in relatively moderate conditions to keep her going in a straight line. When conditions require more forceful control I pull in the chain put it through a tyre and clip it and throw it back in. The sails I use are small and tough enough that adding drag is a better technique than reducing sail, up to a point”.

Don Brazier, 41 foot Narai Mk IV ‘Katipo’

I used a Seabrake drogue on a return voyage to New Zealand from Tonga some years ago. We used a short length of chain on the drogue connected to 100 metres of 16mm polyester warp and a bridle off the stern. We have fairleads on the tops of the stern posts. Winds were 40 to 50 knots but the drogue reduced surfing which earlier had been up to 13 knots at times when surfing under bare poles (which causes a mix of exhilaration and fear !). The drogue halved our average speed to about 3 to 4 knots.

At that time we were tiller steering and had a foot well in the stern deck where we sat – these days we use wheel steering in the new central deck pod which is much more comfortable. On one occasion we were pooped just because of where we happened to be as the wave crest broke over the stern. Without a drogue out we probably would have accelerated away, head of the breaking sea, but it was preferable to be restrained by the drogue and stay lined up with the seas. It gives you quite a shock to suddenly be in breaking water up to your waist, but in moments it had all gone, draining away through the stern netting and the slatted decks.

There were some mean, steep cross seas at times which seemed to roar through like express trains, and we hand steered to keep the stern into the seas. One point to mention is that a catamaran will not respond so quickly to the helm with a drogue out, so you need to keep a careful weather eye and start to turn in good time especially with cross seas.

There is a great deal of energy involved with each approaching sea, the wave water is going up in a trochoidal pattern but the energy is surging forwards often at even 25knots. As your boat gathers more and more speed its kinetic energy increases exponentially and if you broach or bury into the wave ahead that energy has got to go somewhere and there is going to be damage. The faster you go the bigger the potential problem!



Figure 5: Don with the Seabrake drogue used on *Katipo*



Figure 6: A close up of the Seabrake drogue used on *Katipo* showing the flaps that open to increase drag



Figure 7: The eyebolt used as an anchoring point on the stern of each hull of *Katipo* for the drogue or possibly parachute sea anchor.

3. CARRY ON SAILING UNDER REDUCED SAIL

This often necessary to keep off a lee shore, round a headland, or just the need to get there with minimum loss of time. Every situation is different in terms of the wind strength, sea state, and what the boat and crew can cope with.

Tony Murray, 41 foot Narai Mk IV ‘Ika Roa’

In this example from an article in the Sea People magazine Tony left Vanuatu on Ika Roa which has covered many sea miles. He wrote :-

“Once again it was time to head out into the deep blue. The weather was supposed to be fine but 24 hours later we were buffeted by 40 to 50 knots of wind. It got worse, some of the crew got sick. Not a nice way to travel any more. For three days we mounted huge swells, tops blowing off the waves, sometimes hove to, sometimes moving forwards under reefed mizzen and staysail, or mizzen and furlled jib. A mizzen stay parted but the mast stayed put. A halyard doubled as a spare stay. Sail on. Lets get outa here!”

They made it safely back to New Zealand.

45 foot Oro, early Wharram Classic Design '*Amanzi*'

This boat was built in South Africa by Tony Hughes and amazingly sailed through the terrible Fastnet storm of 1979 and later arrived in Milford Haven in Wales. By a surprising coincidence I met one of the crew in Rarotonga where he called by when I was at the wharf on my *Narai* during my 2011 voyage. He said they had no radio and did not learn of all the chaos going on around them during the storm until later. Many high tech racing boats were damaged, some lost and unfortunately some sailors died. Unfortunately I did not have a chance to see him again and learn more details before we left.



Oro *Amanzi* in gale

4. LYING A HULL

This technique has also been used with great success in some cases, while in others not so good! In this situation the catamaran whilst under bare poles is left to take up its natural position lying beam on to high winds and seas.

Nev and Ann Clement, Tiki 46 '*Peace IV*'

Nev and Ann used this technique off the African coast. One reason for not running off was the fairly close coast and a seamount. They experienced no damage.

They wrote:-

“Peace IV suffered two and a half days of Force 10 winds (55 knots and higher and waves 32 feet and higher as measured by a nearby weather buoy) offshore between Madeira and Canaries in the autumn of 2002. As Ruth Wharram suggested before we left Britain on our maiden voyage, we hove to under bare poles (no sails up at all) and Peace IV drifted sidewise with a bit of control of direction depending on rudder angle. When we found the angle we liked, we lashed the tiller bar and settled down by the VHF so I could give our position and situation broadcast frequently and other boats in the area could avoid bumping into us.

As Ruth had predicted, we were frightened at first and then realized that Peace IV was safe and so were we and it was all quite simple. We drifted at about 2 knots and it was really noisy and some waves broke right on top of the pod. Nothing broke. Nothing was disturbed down below. It was simple to do. But it is best to avoid such extreme weather!”.

Rory McDougal, Tiki 21 ‘Cooking Fat’

This is a remarkable voyage in a small Wharram. When bound from Rarotonga to New Zealand in August 1992 during his circumnavigation, Rory coped by lying ahull in two storms. He had just passed the Kermadec Islands and was heading in a generally South West direction when :-

“During the night and the next day a northerly built up until the first gale raged upon us, which was not surprising with a barometer drop of 25 mb in two days. Dog tired but I pushed on making good progress until deciding to lay-a-hull finally as the front passed through with wind gusts to force 9 (41-47 knots). It then becomes a bit silly to keep sailing especially at night. A good nights sleep tucked up inside was much preferable and long overdue.....

We were now 450 miles from Auckland after two weeks sailing. Dare I hope to be under the lee of land soon? The weather certainly had not finished with us that easily, conjuring the next storm two days later with the most violent weather front I have ever seen. Thunder clouds seemed to merge with the sea and brought winds that tore at the water, atomizing wave crests into the air and sounding as though the cabin was being sandblasted. Watching this scene in scared fascination beneath the spray dodger, I noticed the sea birds around and having a tough time with the wind buffeting and shaking their wings.

Cookie behaved marvelously as usual just laying ahull and fending for herself 160 miles North east of Auckland. So near and yet so far, because four days later we were still just drifting. The wind a steady 40 to 50 knots Westerly plunged me into despair making me furious at the elements one moment then weeping and praying the next – ‘all I need is a two day break in these gales and I can reach land. Please, please, please!’

Cooking fuel ran out during this gale on day nineteen of this voyage. Now cold soaked rice or pasta was all I had to look forward to, ‘yum, yum?’. I cut down a kerosene lamp, placing the base of it under the cooker grill which warmed up a pot of food eventually but also covered everything in a layer of black soot, which proved more depressing in the end than the cold food.

Lying-a-hull seemed preferable than using a sea anchor which snatched Cookie over the tops of the 4 to 5 metre waves putting great strain on the cleats and anchor warp. On average a wave would wash over us only once an hour. Otherwise the motion was fairly gentle.

A 24 hour respite after this gale gave the opportunity to make some more ground towards Auckland before again being battered by force 8 to 9 westerlies, barely 45 miles from Gt Barrier Island. By

now I am getting pretty weak after all these days, trying to keep warm in bed just reading books and trying not to go insane while Cookie drifts away from New Zealand.

A day and a half later we were sailing in another lull which allowed us sight of Gt Barrier at last, only 20 miles away but the wind inevitably turns the sea white again, screaming into our faces. Excitement to have spotted land but amazement at how consistently stormy the conditions are. 'Is this normal?' I keep asking myself, finding it difficult not to take all this personally and cursing the weather gods at how totally unfair they are being to me. The temperature is a chilly 13 degrees giving me trouble keeping my limbs warm without any gloves and only socks for my feet. Venturing on deck is a barefoot experience whilst at night I huddle in the sleeping bag with a kerosene lamp going strong.....

One more hurdle to overcome is the breakage of Harry, my fearless windvane which lost his weighted pendulum arm overboard when a particularly nasty wave hit Cookie's sterns spinning her around by more than 90 degrees in an instant. After all these challenges we finally made a landfall at the Poor Knights Islands, arriving after a hard days sailing only to be becalmed overnight between the islands and the mainland. Oh well chance for a sleep and a huge sigh of relief to be alive and still sailing the right way up. This was by far the most grateful end to a voyage I have ever under taken, arriving after 28 days at sea".

What an amazing voyage, and hardly even any sitting head room down below! Rory had a new bigger parachute sea anchor made in New Zealand which works well – see later in this article.

Rick and Jo Wolfenden, 45 foot Oro 'Kate Cooley'

Rick and Jo Wolfenden sailed *Kate Cooley*, their 45 foot Oro along with three of their children to Rarotonga and beyond. They bought *Kate Cooley* in the UK and cruised out to NZ where they settled. But after a few years ashore they were yearning for the tropics again. They sailed from NZ bound for French Polynesia on 15 May 1999. On 26 May, their wedding anniversary, they had strong head winds - Jo wrote:-

*"I baked a 20 knot meat pie for the 20 years since we had tied the knot and as a prayer for not more than 20 knots of wind. We currently had 40 knots and hove to for the night, the swell was rather enormous from the south too. We lashed the rudders amidships but before we went to sleep the port tiller broke. Rick lashed the other one and in the morning that was broken too. Lesson to be learned **don't lash the tillers!***

So Tris and Rick set to rehash the old tillers in the morning, by lunch time they had put something together but when they tried to fasten them to the rudder stocks in the big swell they cracked and broke. Never give up, now come the real Robinson Crusoe style tillers! We took with us the big dinghy sailing rig which Rick was not going to bother with, just as well we did, for when it was all chopped up, bolted and lashed with all the self steering fittings from the original tillers it worked.

*These were completed by late afternoon but we decided that it was too rough to fit them, so we hove to for the night and what a rough night it was. The noise in your bunk when a big roller comes crashing into the side of it is enough to wake the dead! In the morning I made a pot of tea but Rick was so tired he went off to sleep again.....The sea looked awful, huge swell, one minute we were in the trough and ten seconds later we were on the crest of the next monster and sometimes the crest blew off and smacked into us. As I lay in Annie's bunk which is the driest and quietest in the boat, I wondered how much of this *Kate Cooley* could withstand. Rick reckons we had 40 knots of wind gusting 50knots.*

We tried a drogue out from the starboard hull and we put a lashed sail out on the port hull. That night the wind finally dropped right away but the swell was enormous, a full moon hung in the damp and mist giving everything an eerie glow".

I spoke to Rick and Jo recently they consider that more bungy cord on the rudder lashings may have possibly helped. Despite the drogue from the stern and small sail forward. without steering downwind their boat still lay a hull.

John Jameson, 35 foot Tangaroa ‘Taraipo’

John who has completed one and a half circumnavigations wrote after sailing from Opuia in New Zealand to Tonga :-

“By an error of judgment, we nearly demolished Taraipo in our haste to dodge the NZ winter gales. The common strategy when leaving NZ, is to leave on the back of a low early April in order to have a reasonable chance of getting far enough north, into the Trade Winds, before the next low fronts up – unfortunately there are only 2 or 3 such ‘windows’ each austral autumn. We let the first one go, the second one early in May we took but had to turn back 15 miles out with a broken forestay. In fact we were lucky not to have dismasted.

After several weeks freezing our nuts off waiting, we decided to rock off into a potentially favourable situation beginning of June – there was a weak low on the weather fax which we hoped would fill – it didn’t, it deepened and gave us a strong gale (40+ knots) for 14 hours and one big wave which broke over Taraipo. We were reaching at 2.5 knots under bare poles at that time, but basically lying a hull with tillers lashed amidships in the hope that the boat would turn down wind if hit by a breaking sea.

In those conditions I did not want to go on deck – especially at night time. However Nicole and all the food is next door, so I put on my waterproofs, Ted’s heavy welly boots he’d given me for the trip, hooked on my harness and ventured on deck. Well oops, the aft decking had been uprooted, and was laying 30cms above the crossbeams, crumpled and wobbly, and barring the route to Nicole’s place. I managed to fix that by unbolting a bent stainless bracket, and fastening the shattered deck to the crossbeam with a rope lashing – staring at the ocean washing between the hulls kept my focus on the job in hand.

The other intimidating job was to clear away the remains of the smashed port bulwark (an old repair from Madagascar), and replace it with a temporary dyneema line guardrail.

On reflection, we should have bided our time, and delayed our departure from NZ. Taraipo, Captain and crew are much the worse for wear. Not only did the decking crumple and the port bulwark get smashed, three of the welded stainless suspension brackets which attach the hulls to the third beam broke. Fortunately we can source marine plywood, a welder, and have a perfectly calm harbor in Tongatapu to complete the repairs in.

N.B. with hindsight, in the gale I think that we should have either:

- *Headed down wind and run with the waves, or,*
- *Streamed a drogue from the stern. To accomplish this in strong gale conditions would require it to be easily released if necessary.*

Next time I will have a proper drogue like a Jordan Serial drogue, my previous attempts streaming warps did not produce enough drag to hold her stern to”.

Glenn Tieman Pahi 26 ‘Peregrine’ and later Tama Moana ‘Manu Rere’

Glenn comment on lying ahull:-

“The Wharrams advocate lying ahull, beam on, however I have found the motion doing this insufferable, with the impact of breaking storm seas against the hullsides. The Pahi 63 footer and ethnic designs may be most suited to it due to having the lowest freeboard for their length. I think of storm management as specifically preventing lying beam on, although its reassuring to know that Wharrams can survive it”.

Pahi 63 ‘Kaskasi’ and ‘Spirit of Gaia’

Pahi 63 ‘Kaskasi’ came through a severe gale off South Africa lying ahull as reported by Hanneke Boon:

“Recently we had visitors from South Africa, Wharram sailors from Richard's Bay, who told us about how Pahi 63 'Kaskasi' survived a severe gale. This happened some years ago when 'Kaskasi' was being sailed back from Kenya to Richards Bay, SA. There were just 2 crew on board, the owner and his (pregnant) wife.

They hit a severe gale off Cape St. Lucia, with SW winds recorded at Cape St. Lucia of 83 knots. The skipper downed all sail and let the boat lie ahull, he removed the rudders as they were getting a hammering (this is possible on the Pahi 63, by lifting them up through their rudder wells). They spent 2 days like this lying beam on to huge seas while the boat drifted across the Continental shelf (increasing wave size). The only damage was to the slatted platforms as they were hit by waves from below. This same gale sank an Ocean Sailing L34, which was rolled over, the crew were taken off by helicopter.

'Kaskasi' sailed into Richards Bay 4 days after the gale, basically unharmed.

From experience we have found that Wharram Cats, particularly the fore-and-aft symmetrical Pahi hulls (also the Child of the Sea/Tama Moana) will lie beam on to the wind when the boat is left to fend for itself. On our Round the World voyage on Spirit of Gaia (1994-98) we spent hours lying ahull in bad weather, with the boat feeling very comfortable and the waves passing under without too much slamming. She would make little leeway, only moving over ground at about 1 - 1.5 knots, depending on wind strength. In a severe gale she may move at about 2 knots. The boat would always stay beam on, turning with the wind”.

Hanneke Boon, 38 foot Tama Moana ‘Lapita Anuta’

Here is Hanneke’s account of Lapita Anuta encountering a following gale in the Bismarck Sea (North of New Guinea) during the Lapita Voyage. Lapita Anuta is a traditional Polynesian double canoe with Crabclaw sails on bamboo spars, like Glenn Tieman’s *Manu Rere* and was sailed without motor. They left Karkar Island on 5th January 2009 encountering increasing wind and waves.

“Day three (7th January) started at midnight with a change to the stormsail as the wind was now WNW around force 6-7, the seas very rough with much water coming on deck and the cabins getting wet inside, the large deck hatches are not completely watertight. By 02.30 the wind got even stronger and we took down the stormsail and I tried out the sea anchor (made from two nesting rattan fishing baskets and a weight on a 50m nylon anchor warp). The sea anchor was not effective to keep the sterns into the wind (I think this problem was caused by the bamboo shelters over the cockpits, as they give quite a lot of windage aft), the boat determinedly turned beam on, as she always does when all sail is taken down.

Lying beam-on however was more comfortable than expected, the big waves just rolled under the boat, the hulls lifting over the crests, with only the odd awkward breaker coming over the decks. We hauled the sea anchor back on board and lashed the tiller and 'Lapita Anuta' moved at a gentle 1.1 – 1.2 knots sideways in the direction we wanted to go until dawn, while we tried to sleep in our wet cabins, at 6am we hoisted the stormsail again, we had another 22Nm to go to Garove waypoint and we wanted to get there as soon as we could.

With the following wind from the West we were sailing at 5-6 knots with rain as well as waves making everything and everyone very wet. By 10.30 the waves were huge, the wind around force 7 gusting 8 and we were getting near the waypoint, which I had set about 2Nm SSW of the island, thick rainclouds were making visibility terrible and we could not see the island.

As we drew close to the waypoint still no land in sight, so I asked Peter to get me a new waypoint right in the entrance to the crater lake off his computer chart, as my photo copy paper chart was rather a small scale. As I entered the waypoint into the GPS, to my horror I found we were 9Nm South of where I thought we should be, I must have made a mistake with my waypoint latitude, what now? Would we have to bypass Garove altogether and face another day or more in these storm conditions? What would Klaus do if we did not turn up, we could not reach him on the VHF? To make the harbour we would have to take the wind on the beam, would she be able to sail like this in these huge seas? Matt encouraged me to try, so we did.

Here is where 'Lapita Anuta' showed us once again what she was capable of. Under tiny stormsail she ploughed on taking the wind forward of the beam, so we could make track for the harbour entrance (including about 15-20 degrees leeway and drift). The next problem was how to get in, for the wind started to head us as we drew close to the island. Two canoes, without outriggers, came paddling out, handling the big seas beautifully. The half naked men inside them were also beautiful and savage looking, but in fact friendly and gave us advise to head for the NW side of the entrance.

We managed to tack in under sail (we had no motor), rapidly hoisting more sail as we got close, as the boat would not tack under small stormsail alone”.



Hanneke at the helm of *Lapita Anuta* during gale, taking the waves on the beam. This photo does not do justice to the wave size.

Two noteworthy Non Wharram Catamarans lying ahull

One case was the Australian 38 foot Simpson Catamaran *Ramtha* which was abandoned in the infamous 'Queens Birthday' storm with winds gusting to 90 knots. Problems were caused to a number of boats heading North in a cruising rally to Tonga from New Zealand.

The owners of *Ramtha*, William Forbes and his wife, had lost steerage and were being pounded by huge breaking seas. The situation seemed grim and they feared capsizing.

They were taken off their boat by the NZ Naval Ship *Monowai* in horrendous conditions.

Both of them were dragged through the water on safety lines which had been shot across to them.

The interesting fact is that their catamaran drifted away beam on with the engines left ticking over and the companionway door open. She was later found, salvaged and towed into Tonga, where after sorting out the salvage rights, *Ramtha* was returned to her owners. I was anchored next to her in Vavau Tonga two months later and she seemed to have come through unscathed.

Another case was Richard Woods' 9.9m catamaran *Eclipse*, which he abandoned in Tehuateg bay off Baja California after his old parachute shredded, he was not happy running off, and then fearing capsizing while lying ahull he was taken off by helicopter. His abandoned boat was found much later 1100 miles away, a haven for sea birds!

These two cases demonstrate how stable the catamaran form is under bare poles and that certainly a reasonably large catamaran is fairly hard to capsize even drifting unattended, beam to the seas.

One theory mentioned by Voss and more lately in the book by the Pardeys on Storm tactics is that a slick forms to windward of a vessel lying a hull, square drifting, which causes premature breaking of waves much of the time. A similar effect is suggested to occur with a sizeable parachute sea anchor up wind causing waves to break before reaching the boat.

5. HEAVING TO

The bow is turned into the wind, and then the tiller can be lashed to leeward and likely a small sail raised aft depending on your rig will help. My own boat, a Narai MK IV with a cutter rig, heaves to fairly well in moderate winds with just a triple reefed main sail sheeted in fairly tight, but experimentation is needed to see what suits your rig best. Sometimes a head sail needs backing to windward.

It is a technique that has been used on keelers for years in gales and storms. It is also often used in situations like arriving at a destination at night and wishing to wait till dawn to enter, so as not lose much ground.

I have not tried the Voss technique of heaving to with the assistance of a small drag device from the bow. It is probably more comfortable than lying beam on and with a catamaran would be best to attach your warp to the lee bow.

Glenn Tieman, Tama Moana *'Manu Rere'*

Glenn Tieman sailed his Pahi 26 *Peregrine* across the Pacific in the 1980s and has since 2007 been cruising the Pacific with his engineless Tama Moana/ Child of the Sea design called *Manu Rere*. He lives on board and has sailed for thousands of miles over the years. He is a great enthusiast for heaving to in bad weather but comments:-

"Manu Rere heaves to extremely well. In fact I've come to realize that boats without mizzens simply can not heave to. What they do instead, sawing back and forth between close hauled position and beam on, is a lousy substitute for real heaving to. With no main, only the mizzen sheeted a little off to one side, Manu Rere stands solidly in close hauled position and proceeds straight downwind, very slowly, over her quarter. This is far easier and far more comfortable than lying to a sea anchor. It works so well not only due to the strong weather cocking effect of the mizzen well aft, but because raising the rudders shifts the lateral plane forward, further improving weather cocking, and eliminates worries about backing down on the rudders".

Note the Tama Moana is the only large Wharram Catamaran that has rudders (steering paddles) that can be lifted out of the water. She is also the only one without skegs.



Glenn Tieman's "*Manu Rere*" under full sail.



'*Manu Rere*' with steering paddle/rudder pulled out of the water.

6. PARACHUTE SEA ANCHORS

These are much larger than drogues often having a diameter close to the overall beam of a catamaran. These are now routinely used by keelers and multihulls both in bad weather to keep aligned with the breaking seas and to allow minimal leeway. They are also used to stabilize a vessel at sea while repairs are made. Large parachutes are also routinely deployed from commercial fishing boats to hold station when working. Initially military surplus cargo parachutes were used but these days there are several good manufacturers making parachute sea anchor.

There are many reports of successful use of parachute sea anchors and drogues in the book Drag Device Data Base.

Phil Franklin, Tiki 38 'Tranquility Base'

Phil Franklin of New Zealand wrote a very full report to Paratech Australia about his parachute use on 'Tranquilty Base':-

Hi Alby;

Thanks for your phone call the other day, the support and after-sales contact from yourself and NZ dealer RFD NZ Ltd has been much appreciated. It is in keeping with your excellent parachute anchor, which I consider to be a fundamental part of my sailing, my boat, and my preparation for cruising. I decided to purchase your product over the other brands available, for several reasons. Firstly, the excellent dealer attitude. John and Ross at RFD listened to what I wanted to do, made their recommendation for the setup, visited the boat to ensure the bridle setup would be appropriate, and then custom made the bridle and rode. Secondly, your product appears to be stronger than others. Thirdly, the setup you offer is vastly simpler than some others. It was also refreshing to be given information relevant to my particular boat, a cruising multihull.

My boat is a 12m Wharram Tiki catamaran, 6.2m beam, displacing around 5000kg laden. I have built her in ply, foam and glass, she has long low aspect keels, veed hulls, and skeg hung rudders. She has moderate windage, 2x 15hp outboard motors midships, and her gaff schooner rig propels her at up to 15knots off the wind, and 8-9 knots to windward.

Prior to leaving from NZ for New Caledonia, I set up the bridles, which are around a boat length each, on the forebeam, and took them back down the port side of the boat to the cockpit. The bridles have long soft eyes spliced in, enough for 3 full turns around the forebeam where it meets the inboard sheer. You would need a good reason to attach them anywhere else on a catamaran. The bridles were cable tied to the rubbing strake (a feature of my boat) as I don't have a toe rail. A toe rail would be better however. The large galvanised steel thimbles in the rode end of the bridles were shackled to the thimble on the end of the rode, which, in its deployment bag, was lashed to 2 strong pad eyes, on the aft deck. The other end of the rode was shackled to the parachute, tucked away in the dodger. The retrieval line was set up as per the diagram in your

handbook. 50m of 8mm polypropylene 3 strand, one end with an orange soft mooring buoy, the other shackled to the stainless chain supplied on the parachute. In the middle, a loop allowed four inflatable fenders to be tied on. All this was stuffed into a mesh bag. (it does take up a bit of space!) So with all the setup in place, we went sailing!

On our return trip from New Caledonia, we entered a strong easterly flow south of Norfolk Island, around 150 miles north of New Zealand. It looked set to stay for a while, so with wind and sea building, I decided to deploy the parachute before dark. In around 30 knots and 3m waves, conditions were still quite tame, and we had no trouble dropping sails, pushing first the retrieval float over the side, and then as it drifted to windward, the parachute in its bag. I should have poured a bucket of water into the bag, as it was quite buoyant, and took a few minutes to sink enough to drift away. A light tug on the rode had the chute sliding out of the bag about half a boat length away, abeam. The rode was very easy to control, and snaked out of the deployment bag easily, with an occasional sharp tug to keep the chute filled, and tension on the rode. After all the rode was out and the deployment bag over the side, the load came on the cable ties, which unzipped along the side of the boat without putting up much struggle! Immediately the boat settled down bow into sea and wind, and I checked the bridles were sitting correctly under load on the forebeam and lashed both tillers amidships. You really appreciate having it all set up for easy deployment at this point, as next step is to square away and have a cuppa! From lowering sail to going below was less than half an hour.

By morning we were in 40 knots gusting 50, and 6m breaking waves. The odd wave would go right over the boat, but she was happy enough, rising easily to the sea, only the tops of the bigger ones coming aboard. Down below it was quite noisy, with the waves giving the impression we were sailing fast. But it was the sea passing us by, not us passing through it. Looking through the escape hatches I watched the foam stationary under the boat. Looking out the windows, I looked up at the crests roaring by. Spectacular. Bang! A wave on a slight angle would crash into the boat. The energy from the waves passed into the contents of shelves, sending books flying. One of the crew thanked me sincerely for building a strong boat. We stayed in our bunks, dozing, not caring much for food. We could feel the rode stretching, and the boat moving backwards, then coming up on the rode. My earmuffs and some bluetack allowed me to tune out the noise, and sleep.

Minutes turned to hours. Next morning the wind generator blew a 30 amp fuse. I changed it to a 40. The wind generator blades were deforming in the gusts and hitting the pylon. Shortly after, blades flew off, and we had to act quickly to stop it, as it tried to shake itself and the back of the boat apart. The brochure said "hurricane tested" and in 3 years and many gales I hadn't had this happen! . At this time, I would not have called the conditions extreme. Tough, but definitely not extreme. As I marveled at the foamy seascape, the albatross and the petrels played around the boat, mocking our discomfort,

I checked our position regularly, keen to see how much we were drifting, and we kept an eye out for shipping. I kept a radio watch and maintained our schedule, but with no wind generator, power conservation was required. We used the excellent little ACR C-strobes from RFD, tied to the shrouds. Another boat not far away activated its epirb.

A week earlier, and not too far from here, a 22m catamaran got into difficulty, crew being taken off. I wondered how we would have coped and what our tactics would have been without the Para-anchor.

On the morning after the third night, the forecast indicated a slight easing of the wind, so we decided to retrieve the Para-anchor and get sailing. I hoisted a deep reefed mainsail (like a mizzen on our boat) to keep us pointing up, and in 25-30knots still from the east and around 3m broken seas, we motored carefully toward the orange buoy on the end of the retrieval line, while it took 2 strong blokes about half an hour to pull in the rode, snubbing it round the windlass if the bows started to blow off, and on the faces of the bigger waves. The buoy was retrieved easily with the boathook, pulled in over the forebeam, and the remaining retrieval line with the fender floats recovered. The parachute was last, easy to handle, as the recovery of the retrieval line had automatically deflated it from behind, and it slid on board like a folded umbrella. The foredeck resembled a plate of spaghetti, so that was squared away and we started what was to be a 370 mile beat home.

Our total drift was 19 miles downwind, over 62 hours. In comparison, if we had run under bare poles towing our drogue we would have ended up well into the Tasman, with even more distance to sail home. Being stern to would have made the cockpit wet and (more) unpleasant, I would have worried about losing our stack of windsurfers and surfboards on the aft tramp, and the generator and outboards are more vulnerable from behind (They started first time). Other options could have been to heave to, or keep sailing very slowly, which would have also involved leeway, tired cold crew, and quite probably some damage. I don't consider lying ahull to be an option.

Interestingly, when I think back to around seven years ago when I first started researching parachutes during the build process of my boat, there were lots of ideas, and many anecdotes from "storm" survivors in the Drag Device Database. I am fortunate to have been able to take advantage of this wealth of experience, which has now been developed by Para Anchors Australia into a simple working system, out of the bag. But we were not in a survival situation, or even a storm. Just a tough blow from the wrong direction, and a nasty breaking sea, the effects of both of which were minimized by being able to safely stop the boat head to wind and sea, and leave her riding relatively quietly "at anchor" while we went below.

In summary, when it came time to make the decision to stop sailing, the Para-anchor was as much a part of the crew as any of us, reliably and untiringly protecting the boat by holding her in the safest position, bows into the sea and wind for 3 nights. Like many offshore boats, I am not insured. I wanted to be conservative, reduce damage and wear & tear on the boat. Keep crew safe. There was a reasonable amount of cost and preparation involved in the setup, but insignificant in proportion to the overall value of the boat. Thanks for a great product!

*Phil Franklin
Catamaran Tranquility Base
27 July 2004*

Wayne's Tiki 38 'Tapasya'

Wayne has been sailing for 49 years on a variety of boats. He has been north from New Zealand to Tonga and Fiji twice on his Wharram catamaran, and has used his parachute six times in total.

It is about 12 to 15 feet diameter and was bought second hand. He used it 4 times in only moderate conditions to rest and not lose ground, mainly when his self steering vane failed early in the

voyage when single handing to Tonga. He uses 100 metres of rode but only 60 metres in light conditions.

He has used the parachute twice in severe conditions, very steep seas and winds to about 50 knots. On each occasion he had no problems with rudder stress and considers it vital to have an adequately sized parachute – better too large than too small. He says :-

“I also would like to point out that when launching a parachute, (to windward) I consider it ESSENTIAL that it be wet, to get it under the surface as soon as possible, as this is the time when boat is most at risk (my opinion)”.

The last time it was used in a storm it shredded at about 10 pm and the boat lay ahull with the bow pulled slightly to windward for the night. The wind moderated the next morning and the parachute was retrieved, which takes me about half an hour, snubbing the warp against the main anchor cleat and pulling in each time it slackens on the rebound.

Also on retrieval, I pull on rode as the bows DROP, therefore using the pitch down to remove completely any pull from the chute. When the bows rise again, that is when the stress comes on the rode and the boat is pulled towards the chute. This is a VERY easy process and could even be done with one hand if required. It is probably worth noting that both in windy and calm conditions that the chute can drag the boat upwind (current dependant) at approx. 2 Knots. As I have stood on top of the bimini watching during rough conditions, it is quite noticeable that the chute opens/closes like a squid and I am sure this pulses the boat through the water... so efficiently that if I was becalmed in a current, I would launch it if the direction of travel was going my way. Easily checked by dropping some wet toilet paper in and observing direction of movement as it sinks”.

Unlike most sailors he runs the warp straight out over the main central bow roller and has a continuous bridle line from bow to bow that is in total 18 metres. Each bridle side is nine metres long. In the middle is a figure of 8 knot with a short length of tube in the loop as a chafe protector – a length of rope is tied to this - the free end tied with a rolling hitch onto the main warp. This bridle is always used on his anchor warp for everyday anchoring on the bottom near shore. This system means it is easy to start pulling in the rode when the storm subsides.

He uses old large diameter fire hose (approx. 75cm) as anti-chafe which is permanently inserted on rode and can be slid to where required then lashed to a fixed point with the attached 5mm line (knotted through a hole in tube).

Forsheda rubber shock absorbers are on the end of his bridle lines and also on his rudder lashings when fixing them amidships while using the parachute.

He has nothing but glowing praise for parachute sea anchors.

Warren Matthews, Tiki 38 ‘Natural High’

Warren has a fine Tiki 38– see his blog (below) to learn all the details about his build and sailing. He has had much experience at sea in the last 30 years, he had much praise for the seaworthiness of his Tiki :-

“....the canoe shaped sterns are a major factor in their sea-worthiness in a following sea. Not once did we have a solid sea break over the aft deck. Had the odd occasion where we got a

'sneeze' through the decking. In fact, I spent many hours watching the seas rise up way above the aft railings and thinking...this one's going to dump on the aft deck...but, they never did. Instead they would break just outside the boat, the stern would rise up and the wave would pass under.

In many cases the boat would surf down the wave reaching 14 knots. BUT...this is the good part. It surfed down straight. In fact, when I compare it with all the other cats I have had over the years even the 76 foot one, not one of them would track like that. They would all have a tendency to veer off. The reason why the Wharram did not do that is no doubt in part due to the canoe sterns, and I am also sure the underwater shape of the hulls also contributes to the sea kindly actions”.

On 4 June they were abreast of Norfolk Island en route from Picton in NZ south island bound for Noumea.

“Conditions continued to get worse on Monday night and by that time there was not a dry thing left in the boat. The force of the boat falling into the ‘holes’ had enabled water to come in the escape hatches and as a result all the bedding in both main berths were soaked. Even worse was when we checked the forward starboard cabin we found three feet of water in it. This was my fault as it appears that the deck hatch was only secured on the first notch. Pretty stupid eh!

Anyway, we bailed out that compartment in which all our supplies were floating around in including our favourite chocolate...ate it anyway. At that stage the wind in the high 40 knot region with gusts over 50 knots and the seas had become very steep and tumbling and we were getting hit from multiple directions. Around 1am in the morning we took a wave right over the boat and lost our electrics. No lights, no auto-pilot or navigation gear. Fortunately we have a separate 12 volt battery for the water generator and I was able to switch the important gear through to that system and run the generator to keep it powered up.

At 2am I made the decision to put out the sea anchor and ride it out until daylight. Fortunately we had tested it before and were able to deploy it smoothly. After deploying it Marianna noticed the port rudder flopping around. The nuts had vibrated off the heavy duty stainless bars securing the rudder which in turn enabled the bolts to come out and broke off one side of the stainless supports and bent the other..... I tried to secure it the best I could with lashings but when daylight came it was nowhere to be seen.

During the night we heard communications on the VHF that rescues were taking place with an 80' race boat who was trying to make it to safety at Norfolk Island. Fortunately they did, there were 18 crew on board including two guys I knew. Details of this and the other boats that had problems and had to pull out of the race can be seen here. <http://sailnoumea.com/news/nz-update-evolution-sails-sail-noumea-2012-%E2%80%93-wrap-and-thanks>

Only 10 of the 17 yachts that started got to Noumea, with the rest having to turn around and head back to NZ or take shelter behind Norfolk Island. After daylight we resumed heading to New Caledonia”.

After the storm Warren sailed on successfully to Noumea with one rudder where repairs were made. He did not consider that using the parachute caused the rudder loss.

Read more on Warren's blog

<http://naturalhigh-adventures.com/warren-blog/2012/8/11/how-did-natural-high-handle-the-storm-conditions.html>

Warren added :-

“I purchased a sea anchor from Coppins for my Tiki 38. I am from Christchurch in the South Island of New Zealand and tested it several times before leaving NZ to make sure we could deploy it with no hitches...and of course to repack it.

I deploy it off the bow and have no trouble retrieving it. I just use the anchor windlass to winch up to it and then grab the trip line and bring it on board. When deployed the boat does not move at all.

I can thoroughly recommend the Coppins brand...they are very well made and they give good customer service.

Wally Langdon, Pahi 31

Was sailing from the West coast of North Island through Cook Strait South to Dunedin some years ago, a voyage through seas known for rough weather. He wrote :-

“The instructions for our parachute anchor were quite clear - familiarise yourselves with it on your lawn and have a bridle made up. Yeah right as they say (men follow manuals as a last resort!) About midnight, through Cook Strait heading south in a NW storm my wife, Kay, a first time sailor decided she didn't want to be alone on deck at the tiller. We worked out some hand signals, retrieved the gear from a hatch, brought the boat into the wind and as luck and a reasonable memory at the time would have it, launched the chute. A bridle was then made up and we rode out the night secure - we drifted south less than one nautical mile per hour. It was a full moon and all around seemed like a snow scape. A commercial fishing boat that had circled us late the previous afternoon came in the morning - we gave them the thumbs up again. With hand signals again we motored up and retrieved the gear. Since that time we have used the parachute anchoring system to take a spell or a meal in comfort while going to windward and also during the night for a couple of hours if Kay is not confident to sail”.

Brett Parker, Tiki 30 ‘Dolphin Dream’

Brett sailed single handing from NZ to Tonga in 2011. He struck a bad storm that lasted 4 days with winds of 40 to 50 knots with gusts to 70. He had a 12 foot diameter parachute on 100 metres of 10 mm 8 plait warp and a bridle secured to sturdy bollards towards the inside of the fore deck in front of the forward main beam. The rudders were lashed amidships with very very heavy bungy to allow for a tiny amount of give. He made half knot leeway and had his storm jib on a backstay to also help to keep his boat aligned with the wind. The seas did minor damage to the small trim tab on the back of a rudder. This was repaired after the storm. Overall Brett was very pleased with the use of his parachute.

He said that :-

“I did have seas wash through the boat but nothing really serious, and I was glad to be on the parachute. The whole boat would at times get thrown around by these big seas and this grated quite a lot on my nerves. This was my first time in really big stuff and yes it was scary ...but ... everything was going well and the boat was doing well because of my prior planning and practicing. It is important to get the bridle length right. A steadying sail aft is a good idea but it needs to be really small and strong!”

Rory McDougall, Tiki 21 ‘Cooking Fat’

Rory wrote:-

“without doubt the parachute needs to be correctly sized to the vessel to perform as needed off the bows. I used a life raft sea anchor on Cookie from UK to NZ voyage. It was 1 metre square in size and didn't have enough 'bite' in the sea to effectively keep Cookie's bows to wind, so I used it over the sterns instead.

In New Zealand I got the sailmakers in Opuia to make me up a heavy duty 4 metre square sized parachute that does work well off the bows. Yes there is some stern surge of the boat and then a pull forward over the top of the waves, but the fact that the nylon rode stretches and takes the snatch out of the wave impacts makes me feel reassured that the system is softening the blows of the waves.

It is easy for me to tie the tillers secure on Cookie when on sea anchor and I never felt that they 'loaded up' severely. Bigger boats and bigger strains might be more intimidating. Maybe it is worth making sure there are good tie off points for the tillers when anyone uses a parachute anchor over the bow.

I don't mind using the sea anchor over the stern in moderate conditions, but if it got really bad I would want the bows taking the wash by the waves. My main hatches are closer to the sterns, my canvas spray hoods, inflatable dinghy pack, self steering vane etc are all situated aft. I would want to keep those further from point of wave contact if possible. My other consideration is that I fitted stronger cleats forard than I did aft - but that is easy to modify as needed for preference.

However, the real burning debate is being caught in a tight situation where you don't have searoom to run before the storm and have to stop the boat and ride it out. With Cookie I feel confident to heave to under all reefs up to about 30-35kts of wind as long as the seas are not too steep. After that I would prefer to be on a sea anchor and have either the bows or sterns into the wind – doesn't matter which as long as you lash the tillers and rudders very securely.

I would urge all blue-water Wharram cat sailors to go to sea with some sort of equipment and plan for both towing a drogue or to stop the boat with a sea anchor. It is very cheap insurance to have when faced with the fury of a gale and no options to run for cover. Just take something along and have some sort of rehearsed plan to use it. When building why not add bigger sized cleats on bow and stern decks with huge backing pads?? Won't cost or take much more time, but will give much more peace of mind when the load is on the boat!

I personally use a 2 meter wide parachute for a sea anchor on Cookie and this is just the minimum size to bring her bows into the wind in a gale. It brings her sterns to the wind easier because of the skeg area at the stern. I would be happy with a bigger sized parachute. It also goes through my mind of how best to handle all this gear if it was an 8 to 10 meter wide parachute on a 40ft cat!!!! Much bigger & heavier gear to handle safely in the growing storm!!

For bigger boats someone mentioned the Drag Device database which is a valuable read of real life case studies of different boats and what they successfully used to ride out storms. Definitely worth a read for any offshore sailor. My advice is to have gear at hand to give you options. If you don't have anything aboard, you don't have many choices when the shit hits the fan!

My stern cleats are approx. 6 inch alloy with hardwood backing pads. Bow cleats are approximately 8 inch alloy and bolted through top plank of forard beam. After the rode has been cleated off, I always tie the bitter ends around the mast beam, as on Cookie this beam is cradled inside a trough and is never going anywhere - even if a deck cleat were ripped off!!



Tiki 21 'Cooking Fat' on sea anchor in 40-45kts wind during the last transatlantic race (Jester Challenge 2010).

"This picture shows the sea anchor bridle in action. The port bridle rope is loose on the net and ready to be tied back around the mast beam in case of cleat failure. I have had 1 meter crests on top of approx. 8-10 meter waves wash over Cookie whilst on the sea anchor. She has always felt very safe and secure in this survival position. I do believe she could take a lot rougher seas before I would get concerned about damage to Cookie from high dumping crests. In theory, that could possibly scale up to a Tiki 38 riding out 15 meter seas with 2 meter crests on a properly sized sea anchor??

I do still agree with Wharram that to run before big seas and under safe control of any type of drogue is best, so as to be moving with the impact from big crests. But if there isn't sea room, or if the storm is blowing you away from your destination, then in my opinion, a sea anchor bridled off the bows is best.

Video of Cookie on sea anchor in 40-45kts wind in the Atlantic"
<http://www.youtube.com/watch?v=QMmZ9gCht7U>

Roger Ayres, 35 foot Tangaroa 'Marney'

Roger had problems with his parachute which proved too small.

His account, which was published in the 'Drag Device Data Base Book' by Victor Shane, which has a wealth of good information about drogues and parachutes.

Roger and his wife were overtaken by a low off the coast of New Jersey in June 1985. Initially they beat off shore and then used their 9 foot diameter Buord (Bureau of Ordinance) Parachute on 300 feet of half inch nylon with 25 foot long bridles off the bows. Winds were up to 45 knots and the bows were not kept well into the seas. They yawed up to 30 degrees to either side. They were making 2 to 3 knots leeway in steep seas. Roger said :-

"I think that and falling back off a larger 15 foot wave, at an angle, we broke both tillers. Note that a catamaran with two large stern hung rudders when backing into a trough and burying the sterns, exposes two blades and two sets of cheeks to the force of the water, approximately four times the area of a trimaran spade rudder. It is therefore essential that this type of boat (like a Wharram) makes no sternway, else use the sea anchor off the stern. We are saving our Buord for use as a 'lunch hook' and now we have a 24 foot diameter parachute for use off the bow"

I spoke to Roger recently he still has the large parachute but has not had occasion to use it yet.

Glenn Tieman, Pahi 26 'Peregrine' and 38 ft Tama Moana 'Manu Rere'

Glen tells of his experience:-

"The terrible experience sea anchoring along Baja went like this. After a swell passed, in the trough, the stretched rode would pull Peregrine upwind until the rode was slack. When the next swell hit her she would turn partly beam on until the rode tightened suddenly jerking her back around and violently over the crest. I also didn't know how a tripline could be rigged so risked losing fingers trying to get the parachute back.

What the expert (a sailing friend) told me was:

- 1. Use a lot of rode, like 300'.*
- 2. Put a float on the edge of the parachute to prevent it from swiveling. If the parachute swivels a tripline is impossible because it will be wound around the rode. Of course a real idiot might throw the tripline in the sea instead of connecting it to the boat, but then how would he use it?*
- 3. Run a light line from one edge of the parachute to the boat for a tripline.*
- 4. Sea anchor by the stern instead of bow for the reason you state, surging down on the rudders, which not only risks breaking the rudders, but contributes to turning beam on. Like shooting an arrow feathers first.*

Ironically the Tama Moana is maybe the only boat design that would be better sea anchored from the bow because the rudders can be easily raised, and not raised flimsy like kick up rudders but high and solid.

Hardly any cruiser would ever have a use for sea anchoring. The purposes are

- 1. holding the boat head or tail to wind and*
- 2. holding position when necessary.*

Virtually all boaters use an engine for any and all maneuvering or challenging situations

including storms. They just keep chugging along on their way with automated steering, and this works just fine. They don't even have to go outside, certainly no flaking lines and handling rigging out in a storm. I sail singlehanded without an engine or self steering. Peregrine couldn't heave to properly so I used sea anchoring to keep her from lying beam on when stopped at sea. Now, on Manu Rere I heave to, although may have to sea anchor again some time”.

I am not sure about the details of the warp or parachute Glenn used on *Peregrine*.

There are probably very few cruising sailors who sail with no engine. Glen has perfected the art over the years and has the skill and patience, which is great – so much simpler and cheaper with no engine! While I am sure most cruisers use an engine to maneuver when reaching a port or close to land, I am not sure how many cruisers motor in storms. I am sure some do, I do not and have met many other folk who use the techniques described in this article and not their motor.

Glenn is a keen advocate of using a parachute from the stern of a Wharram. He commented on the Wharram Forum : -

“When I first put to sea I knew no more about sea anchors than what anyone else did, which is to say what has been written over and over without testing. I almost killed myself with those methods coming down Baja and decided to never sea anchor again. Then I met an expert friend and told him my experiences to which he smiled and explained how to sea anchor correctly. This is what works and it is rare knowledge..

The salesmen are behind the curve. Last I saw they were still suggesting casting off your trip line so that you can use a swivel. Either they haven't heard how to do it right or they are closed minded.....

In order to hang offshore waiting for dawn I do not use a sea anchor because it is more work than necessary. Instead I heave to or, more often, fore-reach slowly offshore which are very easy. A six foot diameter parachute stops a 26ft Wharram or Tama Moana

He replied to my queries:-

“About your previous concern regarding surging and position. As a crest passes, the boat surges downwind stretching out the nylon rode. After the wave passes the tight rode recoils, pulling the boat back upwind in the trough. So the boat surges both upwind and downwind with the boat ending up in the same place. If the rode is too short and/or the boat is beam on, the whole process is like one horrendous impact and gear breaking jerk, with the boat left in the end coasting to windward in the trough. As the coast guard describe (an article by the American Coastguard) the boat may then turn beam on, which makes the impact jerk much worse because the boat is forcefully swiveled around its own axis 90 degrees as an essential part of the process. This is a really ugly thing to live through. With a longer rode the line stretches out farther under less tension so the recoil is less forceful and more sustained, such that the line may not go slack at all. Ideally it should behave like a weight hanging on a bungee. If you tap the weight downward it will stretch the bungee down then back up without the bungee ever going slack.

You may wonder, if the boat surges both upwind and down why arrange so that the rudder trails when surging downwind? The answer is that the boat is pulled upwind squarely by its bridle but is being pushed downwind by a wave hitting the stern which can push the stern around, just like broaching”.

On May 8th 2004 on the Wharram forum, Glenn commented on his later use of a parachute on *Peregrine*:-

"The parachute anchor I had was given to me by a friend so I don't know its origin. It was about 6 feet diameter, made of thick porous nylon like a knit, and had about six shrouds each of about 3/16" nylon.

Care for some more sea stories?

I spent a couple of days sea anchored on the edge of a typhoon in Western Micronesia. There were low islands in every direction so the para anchor was the perfect tool. After it passed, the waves were so huge that the sails were completely blanketed in the troughs.

When approaching Fiji I failed to find landfall and as night fell the low Lau islands were all around, perhaps as little as 10 miles away and I was lost so I used the sea anchor to hold position.

Along Sarawak one of those line squalls that come off the land at sundown struck going the wrong way, so after running with it offshore a ways, the para anchor was set to stop losing progress and so I could just rest carefree.

Those are just a few examples".

Don Brazier, 41 foot Narai IV 'Katipo'

I used a parachute twice on a voyage from Auckland NZ to Rarotonga in 2011

I had bought it many years before and this was the first time it had been used except for trial use in lower wind speeds near home. It was 3.8 metres diameter and I had 100 metres of 16 mm nylon rode with bridles 20 metres long shackled to metal fittings on each stem post. This means chafe is not an issue which could happen to lines led through fairleads.

It worked well and held the bows into the seas. Wind speed was not extreme, about 40 knots, and since we were in no rush to reach the next port, the parachute was used to hold our position. It was kept packed in a deployment bag which was thrown into the sea to windward after the buoy had been put overboard. Life was very comfortable aboard once the parachute was set, except it was like being on a roller coaster at a fun park. We made about half a knot leeway. The tillers were lashed amidships, but creaked ominously as we at times initially surged backwards when picked up by big seas, so we added some pieces of car inner tube to the ends of the lashings to allow some give. We considered the rudders were under some strain and are since now aware of Glenn Tieman's views on setting parachutes from the stern. I now know also that the parachute was marginally too small, the company has over the years changed the recommendation and since this voyage have bought a larger one.

We retrieved the parachute using the anchor winch to haul the warp in until we could reach one of the parachute shrouds. The pick up buoy line needs replacing with a better floating line as it became tangled and we could not easily reach the buoy.



Narai Mk IV, *Katipo* lying to parachute anchor off the bows



Figure 8: Don with the Coppins parachute used on *Katipo*



Figure 9: Parachute fixing point on bow of *Katipo*



Figure 10: Drogue eye bolt on the stern of *Katipo*

CONCLUSIONS

It would certainly seem that Wharram catamarans can cope with bad weather quite well!
You can draw your own conclusions from the accounts above but I have made some general points.

Running off

This works well and definitely puts much less stress on a boat, but the down side to running off is you stay with the weather system much longer until it either moderates or sweeps on past you. If you are going in that direction anyway it is fine but if not, it can mean you can lose much ground.

The other problem is that if hand steering, it can get really exhausting, cold, wet and miserable and if single handed or just say a couple of people on board there is a limit, especially if it goes on for days as was the case with Pahi 42 '*Mother Ocean*'.

Exhaustion can lead to mistakes and bad decisions.

Generally it would seem preferable to hand steer so that you are aware of the conditions and keep the boat well lined up especially if occasional steep cross seas are a problem.

On the other hand many sailors rely on windvanes or tiller pilots and cope fine – often they are able to relax below decks. Running is not the ideal direction for using a windvane and you can expect a little yawing, which is a potential problem, also in huge seas the wind pressure is not even as you surge down into a trough.

A drogue will not adequately keep you lined up into the seas without hand or self steering.

Strong anchoring points must be organized at the stern for the drogue bridle like the stern netting beam, large deck cleats or special fittings like heavy eyebolts angled on the hull sides medial to the rudders.

The bridle, warp and drogue needs to be carefully readied – perhaps flaked into a large plastic container like a fish box, because once the drogue is cast overboard the line will run out quickly – keep your legs and feet well clear!!

Henk on Orowa was not towing a drogue and broached badly at least twice.

Sailing to Windward

Often the boat can endure more than the crew as it can be a rather violent motion, and the closer to the wind the worse it becomes. I well remember shortly after we had retrieved our parachute south of Rarotonga, sailing at night with a small staysail and three reefs in the main at 8.5 knots on the wind, leaping at times from wave tops – it was unbearable and not much good for the boat either.

We were quickly down to just the staysail and not so tight on the wind any more!

Lying ahull

I think it must all depend on the state of the sea, the steepness of the waves and the size of the breaking crests.

Nev and Ann on Peace IV coped well but Glenn Tieman finds it insufferable! John Jameson and Beat Rettemund were not too impressed either!

Heaving to

Glenn Tieman is very keen and his boat is well suited to this technique. As he points out a mizzen is a great help – every boat is different and one needs to experiment before hand. The fact that Glenn can raise his rudders is good too.

Parachute Sea Anchors

These seem to have a definite place in the bad weather armoury and are good to hold station particularly on a lee shore or so that you do not lose ground in strong head winds. Also of help to hold your boat steady at sea while making repairs or just to rest if short handed. In extreme weather it enables the catamaran to be lined up into the seas making it easier and safer for the breaking crests to rush past.

One issue is whether to use the parachute off the bow or the stern. There seem to be sound points in favour of both techniques.

Warren, Wayne, Brett, Rory and Phil all seemed to get along fine with parachutes off the bow.

Glenn had an unpleasant experience and on my boat I noted some rudder stress, but no damage. I think a bigger parachute might have been preferable in my case and in fact I have now bought (second hand, but unused) another parachute, a 5.5 metre diameter Coppins design.

Roger on his Tangaroa broke both tillers when falling back onto the rudders in a big breaking sea – his parachute was too small.

Rory points out the vulnerability of gear on the aft of your catamaran if parachute anchored by the stern, like self steering gear, hatches, maybe inflatable dinghy on stern nets. Outboards may be more exposed too.

Glenn makes some very sound points about the advantages of using a parachute off the stern and the load on the rudders must then be less when you are hit with a breaking crest than if bow anchored as Glenn described. It can not be too different than when running with a drogue out and being held back by the drogue as a huge sea breaks and surges forward **PAST** you – it is just a question of degree. Certainly you don't hear of boats' rudders being damaged while running off, despite being held back by the drogue into each sea.

A big breaking sea impact is likely to be a short fierce force while the subsequent rode recoil is

likely controlled and slower AND in line. Thus a parachute sea anchor off the stern would probably result in less stress on the rudders than a parachute off the bow. I have now installed large, sturdy eye bolts inside the sterns of both hulls of my catamaran, just ahead of the stern posts and half way between the waterline and the shear line. I look forward to experimenting with these on my next voyage and will report later. (See Figure 10).

Perhaps the perfect answer for a Tiki or a Classic Wharram would be to parachute anchor from the bow but have the ability to raise the rudders like a Tama Moana. It seems that there may be no perfect answer for all situations !

An adequate, in fact **generously sized** parachute, seems essential plus a well matched **long** nylon rode. This should minimize any possible backward surge, and if the stern of your boat is not too vulnerable Glen's argument for stern parachute anchoring in a canoe sterned catamaran seems sound.

Thanks

I would like to thank all those sailors who have written or spoken to me with contributions to this article.

Don Brazier New Zealand Wharram agent
March 2014

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