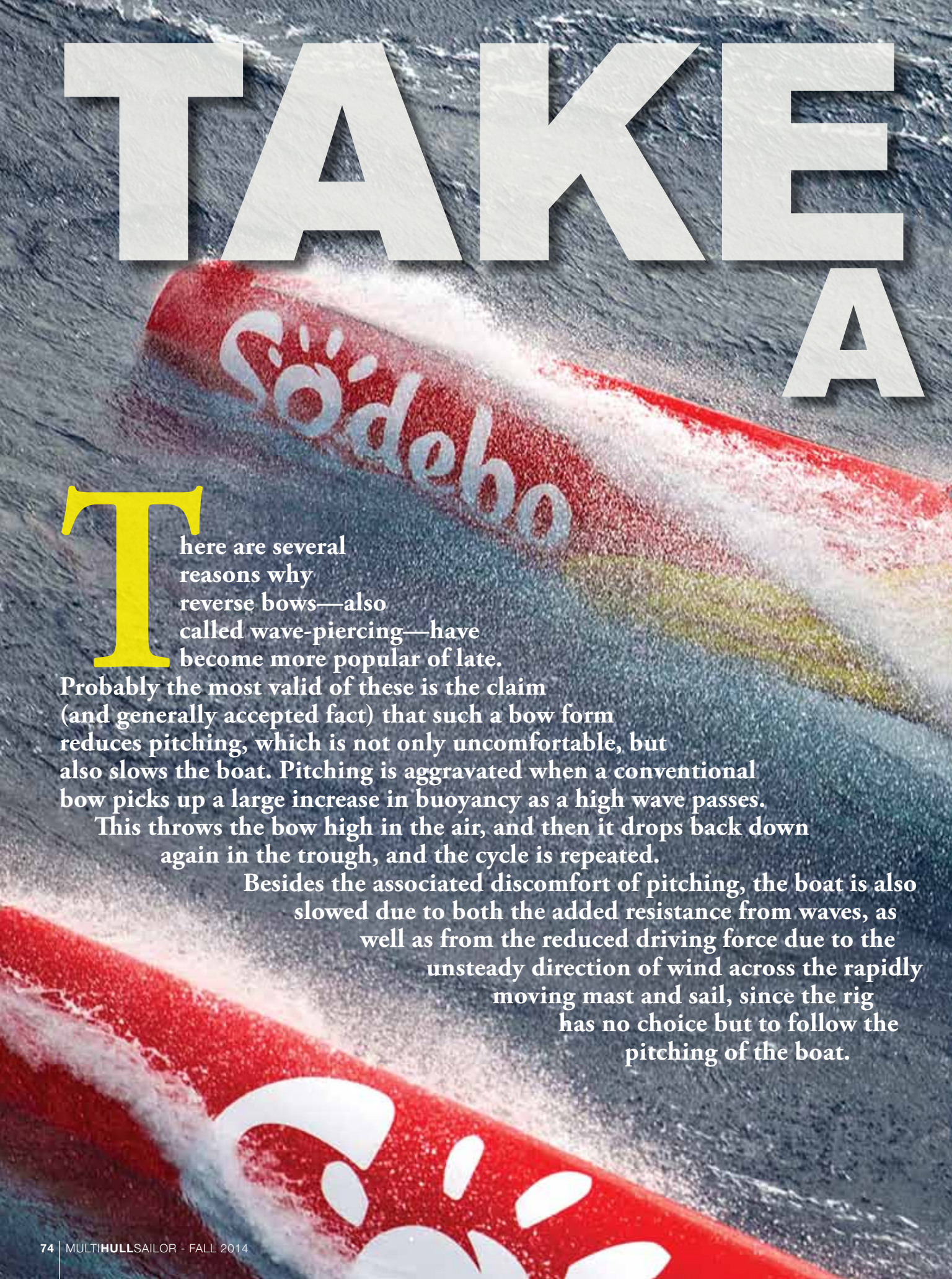
# TAKE A




There are several reasons why reverse bows—also called wave-piercing—have become more popular of late. Probably the most valid of these is the claim (and generally accepted fact) that such a bow form reduces pitching, which is not only uncomfortable, but also slows the boat. Pitching is aggravated when a conventional bow picks up a large increase in buoyancy as a high wave passes. This throws the bow high in the air, and then it drops back down again in the trough, and the cycle is repeated.

Besides the associated discomfort of pitching, the boat is also slowed due to both the added resistance from waves, as well as from the reduced driving force due to the unsteady direction of wind across the rapidly moving mast and sail, since the rig has no choice but to follow the pitching of the boat.

We know that reverse bows are all the rage on raceboats, but what do they mean for the rest of us?

BY MIKE WATERS

# BOW

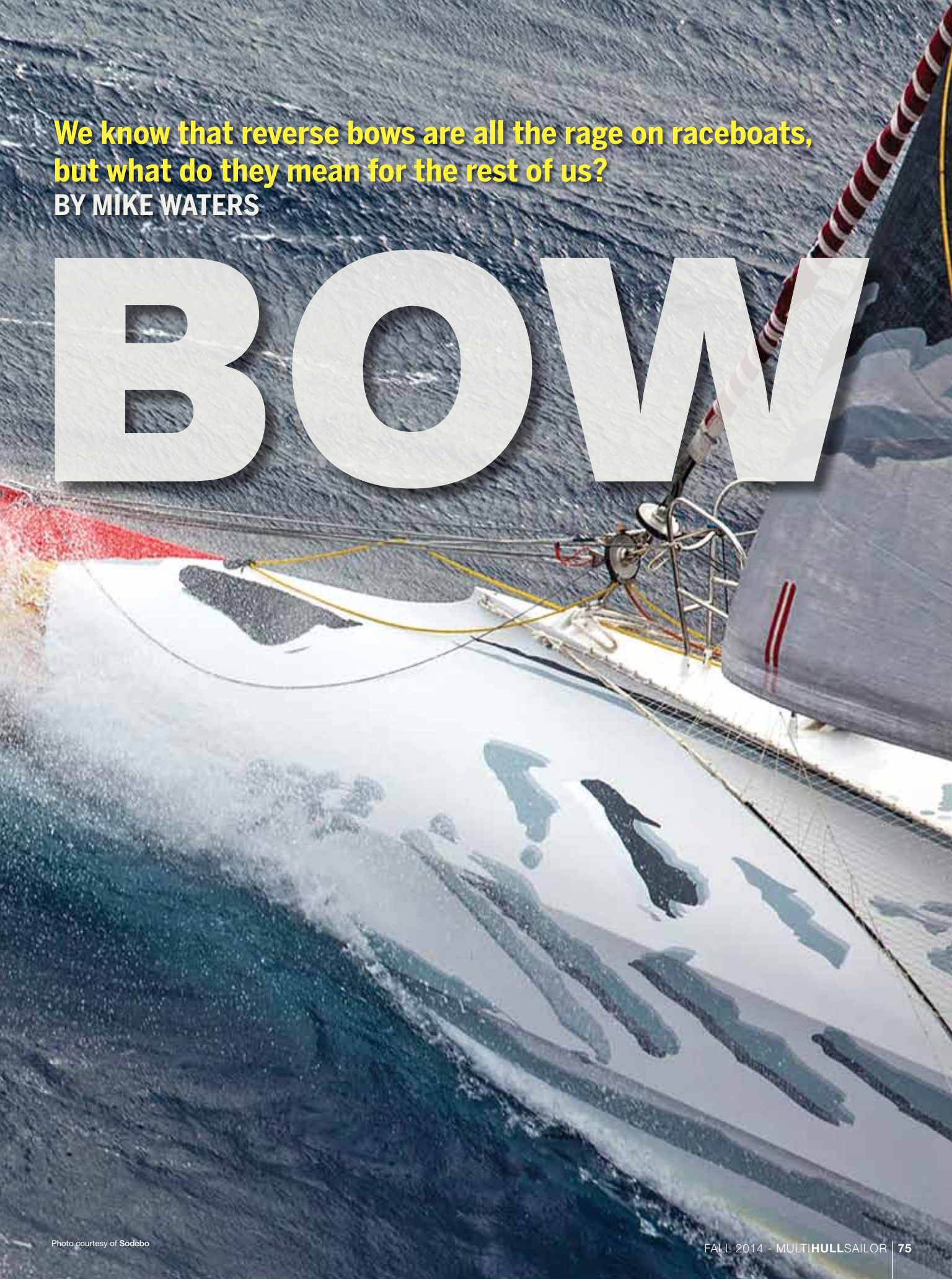


Photo courtesy of Sodebo

# TAKE A BOW

Photos courtesy of **Nigel Irens** (facing); of **Morrelli & Melvin** (left); by **Peter Nielsen** (right)

The axe bows (opening spread) on Nigel Irens's *Sodebo* design, which was designed to be pushed hard by a solo sailor, are a compromise between ultimate performance and ultimate safety; yet they look radical compared to the plumb bows on his earlier *Banque Populaire* design (left). This MM65 (top left) shows a pair of swept-back axe bows; this new A-class cat (top right) has no-holds-barred reverse bows

A reverse bow also allows the longest waterline length for a given hull size and saves some deck weight in the bow. In extreme cases anchoring equipment may have to be moved farther aft, as a reverse bow may be too narrow to support the weight of an anchor, windlass and rode, but this is not really an issue on catamarans, where the ground tackle is usually located further aft between the hulls.

A third reason to favor a reverse bow is that it creates less windage. On a large cruising cat this could affect performance and is also an advantage when maneuvering at close quarters in cross winds.

Some say that a reverse bow "looks fast," but I personally believe that we generally grow to like the look of any feature that finally proves itself and performs well. "Beauty is, as beauty does" as one well-known designer once told me. Aesthetics aside, the important thing is to decide if a reverse bow works well for your needs.

We've gone through the positives, so let's now look at the negatives and see how they balance out for the type of boat we are considering. First and foremost, there is the undeniable fact


Axe bows are increasingly seen on performance-oriented boats like this British-built Dazcat (left) and the French-built Bandit 870 tri (right)

that reverse bows are wet—very wet—as they go more through the waves than over them. On a race boat this can be disregarded, but for a cruiser it could make doing a passage in a steep chop a miserable experience—even if you don't consider the increased risk of being swept off the bow of the boat! And if you happen to own a catamaran with a forward cockpit and wave-piercing bows, then you can be sure that the cockpit will at times become nearly uninhabitable.

There are many good reasons why boats traditionally have large, flared bows. For example, boats that are launched through heavy surf need high bows to keep from being swamped before they even get to sea. Generally speaking, dryness will win out over pitch reduction for many sailors, as there's a clear trade-off here.

And what about the reverse bows on the new breed of fast catamarans like the America's Cup boats? These are appearing on more and more multihulls and have clearly become fashionable. I personally have never been totally comfortable with this long, slender "upside down" bow. When a sail is heavily loaded, there is clearly a large forward lever when bearing away that will tend to stuff bows underwater, and a reverse bow has far less buoyancy to oppose that force. The very shape of it tends to drive the bow deeper because of the hydrodynamic forces on it. There



# HOW DIFFERENT BOWS WORK

With a plumb or nearly plumb flareless or axe bow, there is slightly less hydrodynamic downward thrust of the bows compared to a true reverse bow, and this can sometimes make a difference.

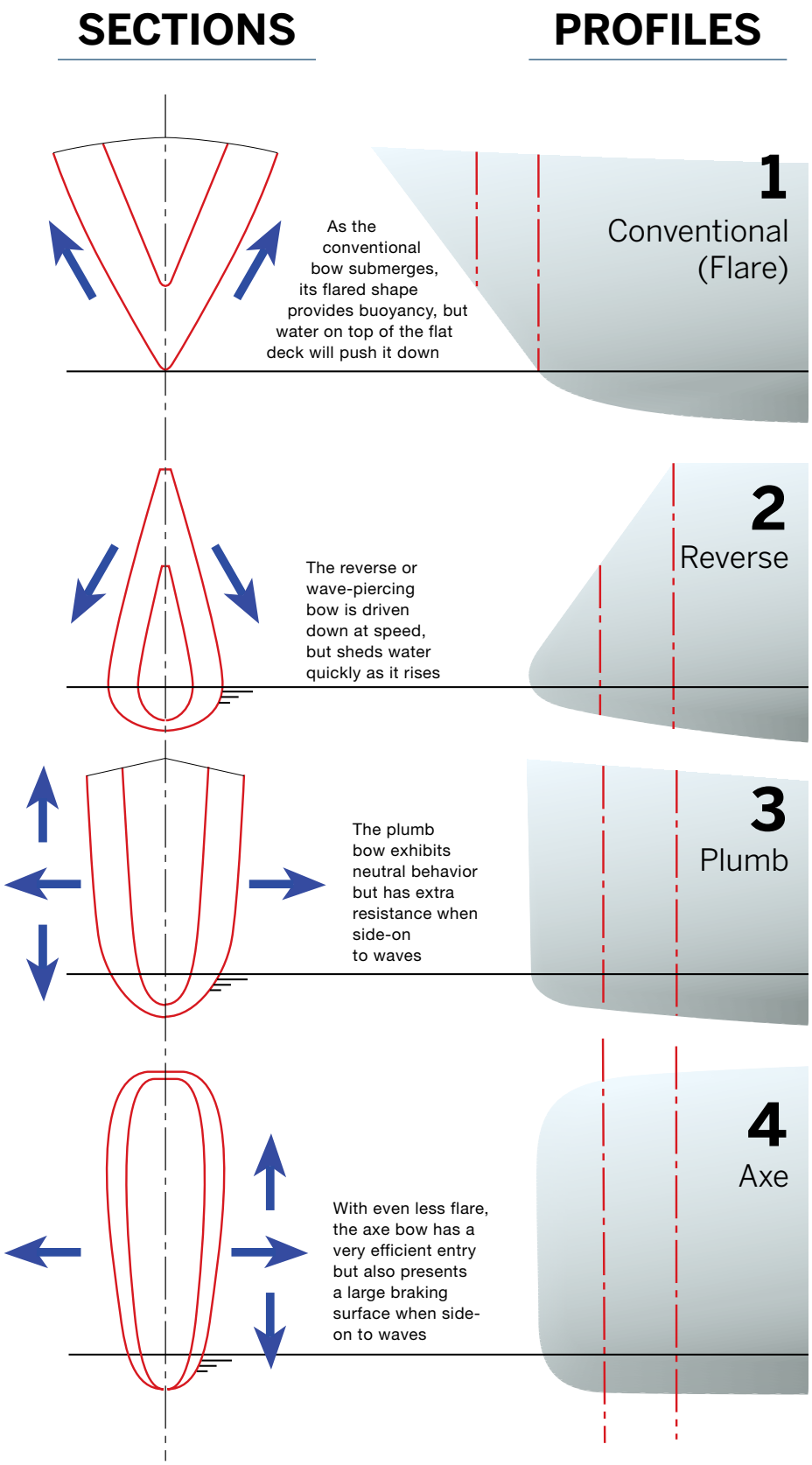
Let's look briefly at these rough bow sections, representing a conventional, a reverse, and an axe bow. If we drive these shapes forward into waves, we see different responses.

If we now imagine the stem pitched down more, the conventional bow (1) resists submerging, and slows the boat, until the deck goes under, upon which it will present the large braking surface of the deck to the water—a no-no. The reverse bow (2) will simply continue to drive down under.

Meanwhile, the plumb (3) and axe (4) bow will knife through the water without excessive force either up or down, unless the boat turns sideways, when it will start acting like a brake. Keeping these bows moving through the water, regardless of pitch angle, is clearly very important in avoiding a pitchpole. One also wants to keep the conventional bow's deck above any solid water and the extra buoyancy will help achieve that. (This primarily applies to fast, lightweight multihulls, as slower, heavier monohulls are far more likely to broach).

Of course, on a cruising boat, no one wants to ever capsize, so you really have to start easing off the sail pressure as soon as the lee bow's deck gets close to the water surface, something that takes a lot of concentration as well as immediate action. Reefing early will significantly increase your margin of error.

One thing of current interest is that the reverse bow moves the greatest volume down low and as shown in the illustration, this can permit an almost flat bottom up forward. Combined with lifting foils, this flat surface can be used to provide early lift to get the bow up. Once up on foils, there is less concern about the reverse bow shape as the bow is now mostly clear of the water. The AC72s of New Zealand, Italy and the USA all used this arrangement to varying degrees.




Illustrations by **Alastair Garrod;** Photos by **Peter Nielsen** (facing page)


are many videos of Extreme 40 or AC45 catamarans capsizing or pitchpoling that show just how quickly a reverse bow can be driven deep under water, and how quickly the boat decelerates.

It seems inevitable to me that these boats must pitchpole if their reverse bows go under with any speed and momentum, as happened to Oracle and Artemis last year with quite disastrous results. Without some form of side vanes to oppose that downward plunge, I think we will see more such "accidents" in the future. Except for a race boat where the crew is ready to sacrifice ultimate safety and deck dryness for performance, I don't think this is an advisable trend, particularly for smaller boats that already have low freeboard. Even on larger boats, protective cuddies and coamings will be needed to make the otherwise wet sailing conditions more tolerable. Another way to reduce pitching is to add a protruding bulb at the bow below the waterline, but this is hardly practical for sailing boats.

Which brings us to what has become known as the "axe" bow shape, which is becoming common on larger multihulls. Here, the stem is vertical or nearly so, sometimes with a slight convex curve, and is curved back sharply at the forefoot and swept back slightly where it meets the deck. The actual freeboard is not reduced so much as with a reverse bow, but the hull forward is slim, with almost parallel sides. This permits the passing wave to surge up and down the straight bow sides as the boat cuts through at speed, with a relatively small increase in forward buoyancy. I have used this approach on some of my own designs, and the relatively narrow, nearly parallel sides allow waves to pass very cleanly along the hull. Yes, the bow will be a little wetter than if there were more flare, but this will not inconvenience the crew very much, and they will still gain the benefit of less pitching. This, in turn, will not tire them as much when

Clockwise from above: Wave-piercing bows have a down side as well; the axe bow as seen on the Neel 45 cruising tri; conservative plumb bows on the pure-cruising Antares cat



Photos of **Nigel Irens** (top); by **Peter Nielsen** (facing page)


beating upwind.

Of course, there are many sailors with cruising cats who seldom choose to sail upwind anyway, and in such cases, there are far more negative risks when bearing away at speed with reverse bows than could ever justify their use.

It's possible that the use of curved lifting foils might help to offset the tendency for reverse bows to nosedive, but this has still not been adequately tested. Just the use of simple side fins at the bow (as once adorned early catamarans that lacked bow buoyancy) would certainly help check nosediving if placed at the right angle, and these were tested—way back in the 1950s.

So, for everything there is a place. We know what reverse bows can achieve, but we must also recognize the price. Reverse bows are most certainly not for everyone. Neither should they be used on all boat types and sizes. It very much depends on where and how you sail, what sort of boat you are considering and of what size. *

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