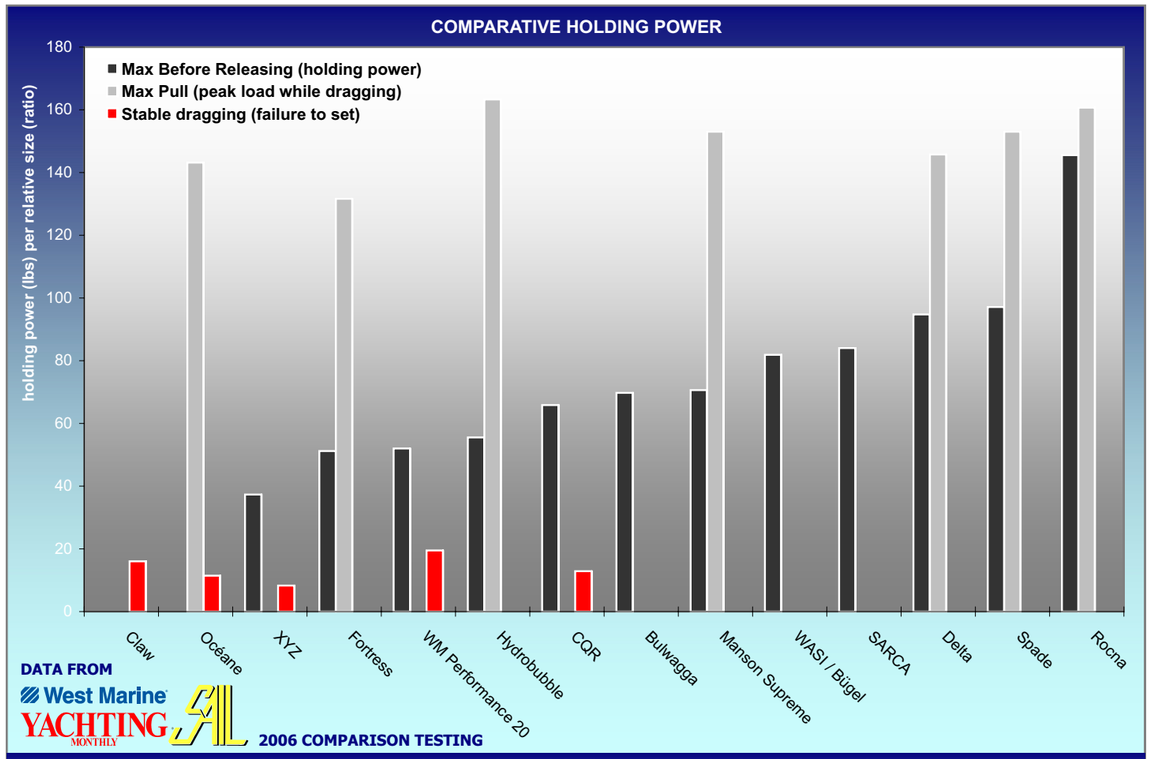
# some notes from the designer of the Rocna anchor

## concerning the West Marine / *SAIL* testing

When Chuck Hawley of West Marine first requested we send an anchor to take part in their upcoming comparison testing, I was cynical. I have never seen a proper comprehensive anchor test, and the recent travesty from *Practical Sailor* and *Powerboat Reports* had warned me to be wary.

The problem with all anchor testing is that the many factors which make a good anchor are never considered - holding power is often the only one. However, looking over this magazine write-up, I am happy to see that a decent amount of effort has been put into this attempt, if not the actual article. With three test locations and three different scopes, this testing can rightly claim to provide a good illustration of anchor performance. What's more, the range of anchors tested was complete, not just the usual handful of traditional types, so giving readers a good comparison.




**The values charted are ratios of holding power to relative anchor weight. "Max Before Releasing" is the most important value. Results of aluminium anchors have been adjusted to allow comparison to steel anchors.**

Having said that, I must also say the write-up from *SAIL* is a bit disappointing. In addition to making mistakes such as listing the Rocna's price as the New Zealand dollar figure, the brief blurbs concerning each anchor are very weak. No real attempt is made to interpret the results in a comprehensive analytical manner. The reader is left to make up their own mind, and several major flaws in the testing are not properly discussed:

- Only the two typical factors of holding power and setting ability are considered. Pulling in a straight line does not illustrate the problems with many inferior designs, which exhibit roll instability and an inability to handle force veers. Then there is build quality, strength, etc, to consider.
- There are substantial size differences amongst the contenders. Some are 10% larger than the Rocna tested.

As I write this I wonder why I am complaining. After all, the Rocna just came out no. 1 in a major international comparison test. But, part of what we do in promoting a new generation anchor design is education, so I feel obliged to point out these flaws when they exist. As good as this testing is, I feel that a properly comprehensive independent anchor comparison test, one to rule them all, is yet to be.

## concerning copies and variations of original anchor types

West Marine's line-up of fourteen anchors included several anchors that are just copies and/or variations of other types. Such copies present a tempting option, since they are usually cheaper than the genuine article. However, when a copier makes his imitation, he has two options. One is copy the anchor identically but take short-cuts to save money. The other is "improve" it, but most such modifications are done by people that don't understand the original design as well as its inventor does, and the changes are often nothing more than useless gimmicks. There are certain things I refuse to compromise on. For example:

- Since the Rocna has a fluke folded from flat plate, I needed to make sure the tip is very strong. We do this by brake-pressing the blade, which is a more expensive process than rolling. The crease then runs the full length of the fluke and provides excellent reinforcement.
- We don't laminate steel. Metal gains no strength from lamination; it's often just edge-welded so the space between the sheets is effectively hollow. This process also has other implications - for example the weld is usually ground off to make it look nice. The result is little weld holding the fluke together. I join others in advising boaters to avoid any anchor built from laminated metal.
- In designing the Rocna's fluke, I drew a proper concave shape by raising the heel of the fluke, so it is a two dimensional "spoon".
- I wanted a properly designed shank to fit on as many rollers as possible, and one which would work well with regard to self-launching and retrieval. A shank with a tall or deep profile is a bad idea, since anchors frequently come up sideways or upside-down. The shank must be of such a shape that it can rotate quickly while moving on the roller. Popular anchors have shanks of quite a low profile - for a reason.


There are many more factors I could list, but the point is: do avoid copies. Stick with the original genuine design and you'll be better for it.

## concerning sales gimmicks

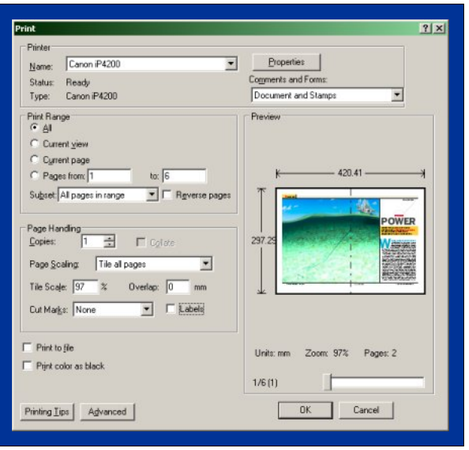
I wanted the Rocna to embody a philosophy of reliability, durability, and clarity of design. It is for this reason that it does not "feature" some of the gimmicks which crop up from time to time on various anchors. We promise a sensible general purpose anchor which is engineered to do its job as well as possible, and now proven to do so. It is my hope that fellow boaters will see the sense in this attitude, and consider the true value of the anchor they are entrusting with their boat's, and their own, safety and security.

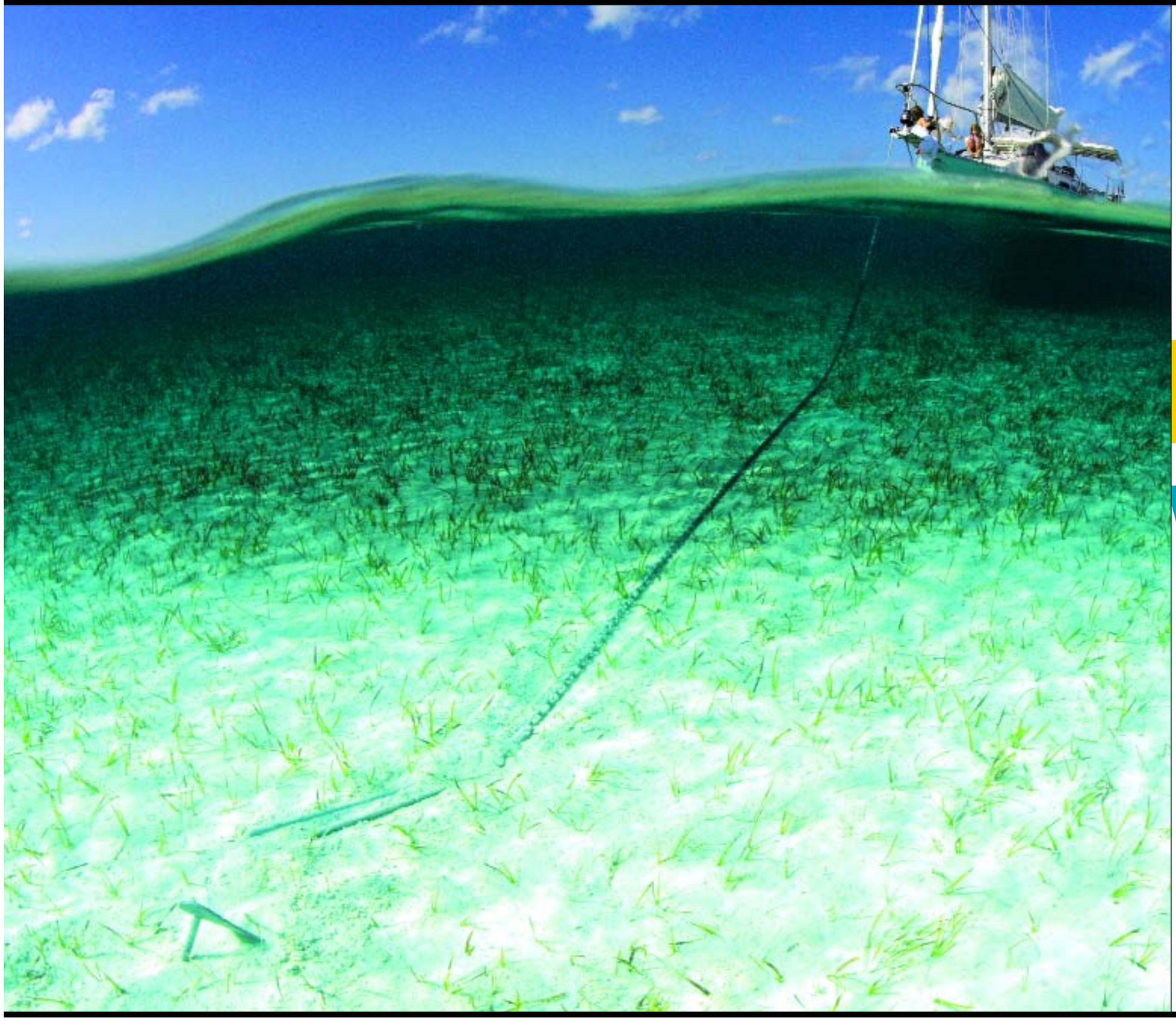
**Peter K. Smith**

## how to print this article on normal paper

This PDF is laid out in a "full spread" format, i.e. two pages per sheet. With Adobe Acrobat (not Reader), you can split these pages and output a normal size on A4, letter, or legal paper formats:

- From the Adobe Acrobat main window, go to File > Print...
- Select the printer you want to use, then click on Properties. In the new dialog window, minimize the printer's printing margins, or turn on "borderless printing" if available. Close the properties dialog when finished.
- Back in the Acrobat Print window, adjust the following settings:
  - ☑ Set Page Scaling to "Tile All Pages"
  - ☑ Set Cut Marks to "None"
  - ☑ Experiment with Tile Scale until you find the largest figure that results in two pages in the Preview frame, rather than three or four. A typical figure is 95% but it will depend on both your printer and paper size. Leave Overlap at zero.
- Click on OK. Your printer should then print the document with each sheet split into two, just like pages from the magazine.





BY BILL SPRINGER

# HOLDING POWER

**WE PUT THOUSANDS OF POUNDS OF FORCE ON 14 DIFFERENT ANCHORS TO SEE HOW WELL THEY WORK. SOME RESULTS MAY SURPRISE YOU**

## WHICH ANCHOR HOLDS BEST?

It should be a simple question. We've put a man on the moon and have decoded the human genome, so surely someone has designed the ideal anchor—one that sets quickly in all bottoms, steadfastly stays in place even in storm conditions, and reliably resets itself if the wind shifts dramatically. It should also be light enough for a couple to handle on a 35-to-40-foot boat and be easy to retrieve when the time comes. How hard could it be to design and build such a basic device? Harder than you think.

After three days of testing 14 different anchors in three different locations off Santa Cruz, California, Jeffery Moser from *Power & Motoryacht* magazine, Toby Hodges from *Yachting Monthly,* Chuck Hawley and several colleagues from West Marine, plus yours truly from SAIL confirmed what we all knew going in—that the effectiveness of any anchor is highly dependent on a long list of variables. Some variables (scope, anchor design, and weight) can be controlled; others (bottom surface, wind, and swell) can't. We also knew that the validity of our results depended on ensuring that all variables (apart from the design of the individual anchors) were kept as uniform as possible; all anchors were tested multiple times with identical scope in identical conditions. We tested in three different locations—on the west and east sides of Santa Cruz's wharf and off New Brighton Beach, near Capitola. The seas had just a hint of swell in all three locations, and the wind varied from flat calm to a maximum of 12 knots. We took bottom samples at each location with a weighted core sampler to determine the composition of the top 5 inches of the bottom surface. All three locations had a layer of fine dark sand on top of harder, finer, claylike sand. The New Brighton location appeared to have a thinner layer of sand and a harder layer of claylike sand than the two wharf locations.

PHOTO BY ONNE VAN DER WAL

## THE OBJECTIVE ::

The goal of this test was to determine the performance characteristics of 14 anchors (on a hard sand bottom) deemed suitable by their manufacturers for a cruising sailboat in the 35-to-40-foot range. We judged performance on how quickly the anchor set, its holding power (as measured by a digital dynamometer attached to the rode and wired into a laptop computer, and whether it dragged (as determined by using visual ranges and precise GPS measurements). Our primary test scope was 5:1 in roughly 20 feet of water, but we also tested performance with scopes of 3:1 and 7:1.

Our primary goal was to learn the maximum holding power—and, more important, how each anchor acts before its maximum load is reached—in a specific test location and at a specific scope that a cruiser on a 35-to-40-foot sailboat would actually use. Each anchor tested is available in a wide range of weights; we used the weight recommended for a 35-to-40 foot boat.

We were able to apply and accurately record how the anchors reacted to up to 5,000 pounds of load, thanks to the 52-foot, 92,000-pound research vessel *Shana Rae*, which we chartered to do the pulling. Equipped with a 375-horsepower diesel engine and a 40-inch-diameter propeller, *Shana Rae* allowed us to apply more force on each anchor than it would ever experience in "normal conditions." But we were looking for an anchor that could perform well beyond "normal conditions," when anchor performance is most critical.

### WHAT THE NUMBERS MEAN

We found that some of these anchors resisted pulls in excess of 5,000 pounds and that others broke out or dragged at considerably lower loads. Would such high loads actually be put on sailboat anchors in real life?

One indicator is the American Boat and Yacht Council (ABYC) table for different boat sizes and types that estimates the horizontal loads put on cleats in various wind strengths. Obviously an anchor should be able to cope with similar loads.

According to the ABYC the load on a 35-foot-LOA, 10-foot-beam boat is 255 pounds in 15 knots of wind; 900 pounds in 30 knots; 1,800 pounds in 42 knots; and 3,600 pounds in 60 knots. For a 40-footer, the figures are 300 pounds, 1,200 pounds, 2,400 pounds, 4,800 pounds; a 50-footer would require a storm anchor that could handle 6,400 pounds (go to sailmagazine.com for the complete table) of load.

The ABYC's figures are extremely conservative. Other authorities, including naval architect Robert Smith, who tested loadings on anchor rodes, suggest that the actual loads on an anchor could be as much as two-thirds *less* than the ABYC figures predict.


## BULWAGGA ::


**WEIGHT: 28 LBS › PRICE: $350**
**MELE COMPANIES › 888-674-4465**
**www.noteco.com/bulwagga**

The concept behind the Bulwagga is fairly straightforward. Its three large flukes are designed to ensure that two flukes will always be properly aligned to dig into the bottom no matter how the anchor is oriented. The shank can pivot in the center of the anchor to help keep the load on the two working flukes equalized. In all of our test pulls the Bulwagga set quickly and held a maximum of 2,974 pounds of load before releasing abruptly (rather than dragging). We concluded that this anchor should be able to handle the load a 35-to-40-foot boat can exert on an anchor with a minimum of 5:1 scope; performance dropped off dramatically at 3:1. The overall results for the Bulwagga were good, but good luck trying to get it to sit neatly on your bow roller, and good luck trying to store it in a locker. Its unconventional shape makes it difficult to handle, and it can't be taken apart to be stored easily down below. That said, it comes as close to "throw it overboard, it's sure to catch something" as any of the anchors we tested. It would be a useful backup/kedge anchor, provided you have the necessary stowage space.

PHOTOS BY ABNER KINGMAN

## CLAW ::

**WEIGHT: 36 LBS › PRICE: $99.99**
**LEWMAR INC. › 203-458-6200**
**www.lewmar.com**

The Claw is Lewmar's version of the popular Bruce anchor that cruisers have been using for years. It stows easily in a bow roller, its one-piece construction is super-strong, and it is reportedly designed to be effective in a variety of seabeds. However, our test results came as a bit of a surprise: The maximum load we recorded for this anchor with 5:1 scope was 886 pounds. And that was only a short spike before the anchor released completely. During most of the 5:1 pulls, it seemed to set and release rapidly without ever really catching. One pull showed it was slowly dragging under a load of about 300 pounds, but we were never able to say with certainty that the anchor had set. We recorded similar results with 7:1 scope. One idea we considered was that the Claw's flukes were simply not sharp enough to penetrate the harder claylike sand. The beach pull was also telling in that the Claw dug a much longer trench than other anchors that produced better results during the holding-power pulls.

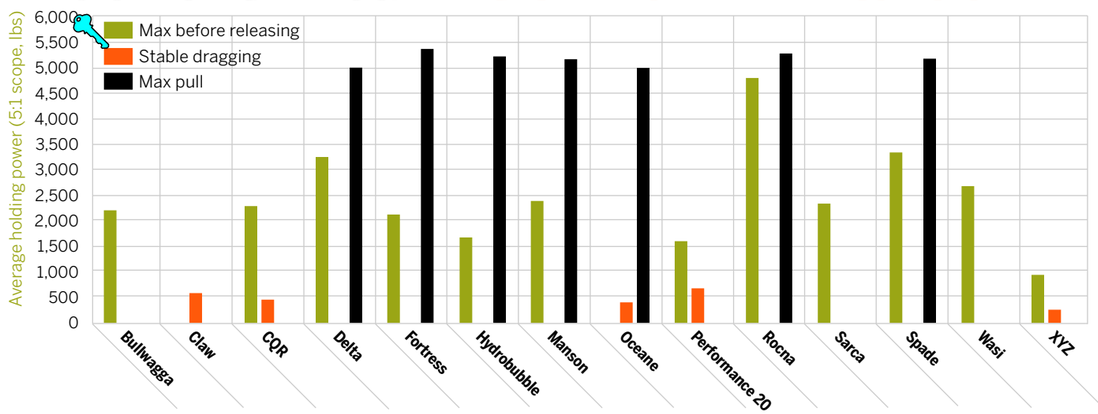


## CQR ::

**WEIGHT: 38 LBS › PRICE: $582**
**LEWMAR INC. › 203-458-6200**
**www.lewmar.com**

The CQR is another tried-and-true anchor that yielded surprising test results. The maximum load we recorded during our first three pulls on 5:1 scope was a very short spike up to 350 pounds, but most of the time we never felt the anchor set. No matter how slowly we went or how we tried to manually coax the anchor to set, it seemed to just skip along the surface of the bottom. The anchor did briefly hold over 2,000 pounds of load on pull four, west of the wharf, but those first three pulls did not inspire confidence and we were not able to replicate the results of pull four even when scope was increased to 7:1. The CQR's relatively sharp point looked capable of penetrating the layers of sand, but something appears to have kept the point from digging in, except when we got that 2,000-pound reading. Like the Claw, the CQR has been around for years. It also dug a considerable trench on the beach.

### ANCHOR TESTING ANALYSIS: AVERAGE OF PEAK STRAIN AT ALL LOCATIONS



# DELTA ::

**WEIGHT: 36 LBS › PRICE: $259.99**
**LEWMAR INC. › 203-458-6200**
**www.lewmar.com**

The Delta is a one-piece plow-type anchor with large flukes. It was one of several anchors that held substantial loads on multiple pulls east of the wharf. On one pull at 5:1 scope, it set quickly and held firm up to 5,000 pounds. During two other 5:1 pulls, it held to a maximum of about 3,500 pounds, then slowly dragged (holding 3,500 pounds) for about 600 feet before releasing. Performance was considerably poorer at the other locations. It appears that the Delta's angled fixed shank, relatively sharp point, and large flukes helped it set quickly and hold (up to a point) as long as the scope was at least 5:1. Performance declined sharply at 3:1. The beach pull confirmed that the anchor set and dug in almost immediately, rather than plowing a long trench before setting.



The test team moved hundreds of pounds of anchors over three days of testing

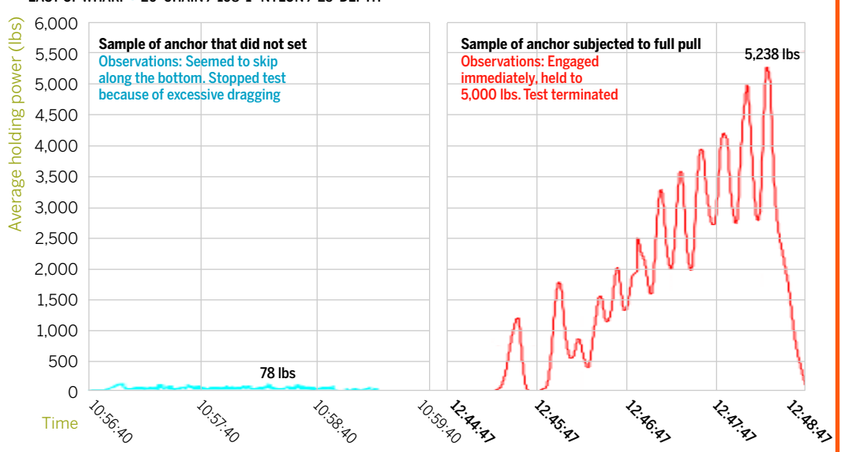
## TESTING PROCEDURE ::

As we gathered anchors for the test, we found that some manufacturers were a bit skeptical. They wanted assurances that the evaluation would be unbiased and that each anchor would be tested in similar conditions. This was our guiding principle, and we described our methodology to each manufacturer prior to the test. West Marine's VP of Product Development, Chuck Hawley, and his colleagues from West Marine have conducted countless anchor tests over the years in our test location (they test any anchor West is considering carrying in its stores), but had never tested anchors weighing between 20 and 40 pounds off Santa Cruz. West Marine sells roughly half the anchors we tested.

Our procedure was as consistent as possible. Each anchor was pulled on the same rode (1-inch nylon rope with a 20-foot leader of 5/16-inch chain) at least three times with 5:1 scope. We moved the test boat (confirming our new location with the GPS) before each new pull to ensure the anchor had a chance to set in a fresh sea bed, and instead of testing each anchor three times in succession, we pulled the first anchor, weighed it, moved the boat, set the second anchor, weighed it, and so on, to make absolutely sure that no one anchor would be tested in a specific area of the bottom. We also tested the anchors with 3:1 and 7:1 scope and separately checked what happened when we veered sharply on the rode. Scope was determined according to *Shana Rae*'s depthfinder and confirmed via leadline. We also used a boat close to shore to pull each anchor in wet sand on the beach to make it easy to see how each anchor set.

Each test was conducted the same way. The anchor was attached to the rode and then dropped over the side. The rode was attached to the digital dynamometer, which was wired to a PC that recorded the strain on the gauge three times per second. The boat idled forward until the appropriate scope had paid out and the anchor had set. Once a set was confirmed, engine revs were slowly increased until the anchor dragged, released, or reached 5,000 pounds. Then the whole process was repeated with the next anchor.

**DATA GRAPHS: EACH PULL WAS GRAPHED USING THE COMPUTER**
**EAST OF WHARF › 20' CHAIN / 108' 1" NYLON / 25' DEPTH**




# FORTRESS ::

**WEIGHT: 22 LBS › PRICE: $420**
**FORTRESS MARINE ANCHORS**
**954-978-9988**
**www.fortressanchors.com**


The Fortress FX37 was one of several anchors we tested that consistently set quickly and held up to 5,000 pounds of load on multiple sets in multiple locations. Its sharp, large flukes dug in immediately. As we increased the loads and the rode became bow-string tight, the boat shuddered and kicked up some impressive turbulence at the stern but the anchor didn't budge. At only 22 pounds the Fortress was one of the lightest anchors we tested, and it was the easiest to stow (it can be broken down and will fit in a slim bag). It also held over 5,000 pounds on 3:1 scope. With its light weight, quick setting and retrieval , enormous holding power at a variety of scopes, and easy stowability, the Fortress ranked high among all the anchors we tested. However, we did bend a fluke slightly during our veering test. This was while the anchor was under load, so it would be unfair to say anything other than it withstood a tremendous amount of abuse and still functioned properly. It would be difficult (but not impossible) to secure in a bow roller when not in use.

# HYDROBUBBLE ::


**WEIGHT: 16 LBS**
**PRICE: $249**
**ANCHOR CONCEPTS**
**888-282-2535**
**www.anchorconcepts.com**

When placed alongside all the other anchors in our test, the Hydrobubble Standard 45 didn't get much respect at first—until it started standing up to multiple 5,000-pound pulls. The minimal flotation provided by the eponymous bubble helps the anchor orient itself so that its heavy stainless-steel blade is always positioned to dig in at the optimal angle. Quick sets and multiple 5,000-pound pulls at 5:1 scope prove it worked beautifully every time. What's most curious about the Hydrobubble is the shape of its blade. Instead of Delta or CQR-type flukes), the Hydrobubble's blade forms an upside-down V. It seems the pull of the shank drives the flat V-shaped blade deeper into the bottom. This could help explain how it penetrated the hard bottom even though the point wasn't particularly sharp. This anchor's performance exceeded our capacity to exert force on it, and I was able to take it apart and bring it back from California in my luggage. It may look unconventional, but the anchor with the effervescent name may represent a new and effective way to anchor a boat.

# MANSON SUPREME ::

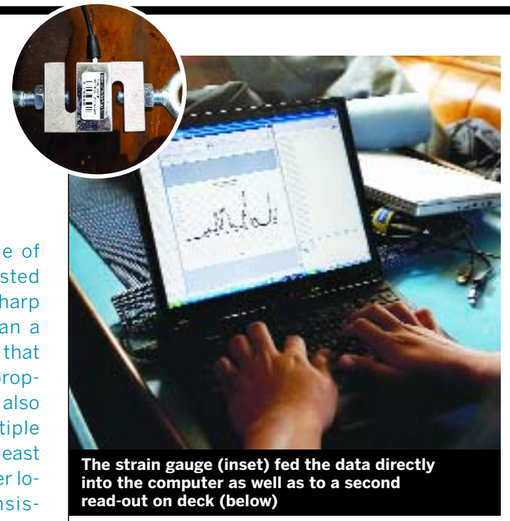

WEIGHT: 35 LBS › PRICE: $450
PLASTIMO USA ›
941-360-1888 › www.plastimo.com

The Manson Supreme is one of several newer anchors we tested that combine a rigid shank, a sharp point, a scooplike (rather than a plow-type) blade, and a roll bar that ensures the anchor is always properly oriented on the sea bed. It also set quickly and resisted multiple 5,000-pound pulls at 5:1 scope east of the wharf. Results at the other locations were also good, consistently topping out at 2,500 pounds before releasing. The Manson was was also able to withstand 5,000 pounds at 3:1 scope. On the beach, it dug in without dragging. Its shape appears compatible with most bow rollers, but it would protrude more than a Claw or a CQR, and its roll bar could possibly interfere with some bow pulpits.

# OCEANE ::

WEIGHT: 38 LBS › PRICE: $259
WEST MARINE
800-262-8464
www.spade-anchors.com


The most obvious difference between the Oceane and the other one-piece plow/scoop-type anchors we tested is that its C-shaped shank is attached right at the front of the scoop, close to the point. In our on-the-beach tests the Oceane pivoted quickly on its sharp point, and its C-shaped shank did a good job of converting the lateral force on the rode into downward/digging force on the scoop. However, the Oceane did not produce consistent results. East of the wharf and at New Brighton, the Oceane failed to set after multiple attempts on scopes of 5:1 and 7:1. However, west of the wharf it set immediately, and we recorded multiple maximum pulls. None of the other anchors we tested had such profoundly different results between venues, and the reason is not readily apparent. The Oceane's unique shape makes it difficult to stow on a bow roller.

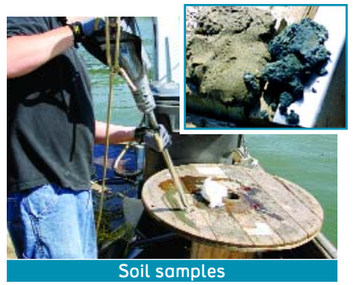


The strain gauge (inset) fed the data directly into the computer as well as to a second read-out on deck (below)

## DATA AND ANALYSIS ::

With the digital dynamometer we were able to record the maximum load exerted on each anchor, to graph how increased load affected the anchor, and to incorporate accurate time and GPS data, along with visual range marking to show dragging. Thanks to Phil Cowley of West Marine, who provided the dynamometer as well as the software expertise to process the data. This procedure virtually eliminated any errors that could arise from physically jotting down readings of over 100 pulls at different scopes.

Over dinner on each test day we reviewed the day's results—everything from bottom sampling, hydraulic-crane operation, to each anchor's performance or lack of performance. Then, when we were all back in our respective offices, we again discussed each anchor's performance via a conference call to confirm our analyses.


Soil samples


Bulwagga


Claw


CQR

Delta


Fortress


Hydrobubble


Manson Supreme


Oceane


Rocna


Sarca Anchorlight


Spade


Wasi


West Marine Performance 20


XYZ


# ROCNA ::

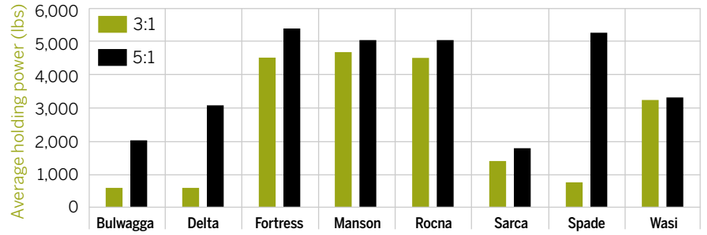
WEIGHT: 32 LBS › PRICE: ~~$500~~

SUNCOAST MARINE › 604-781-8347

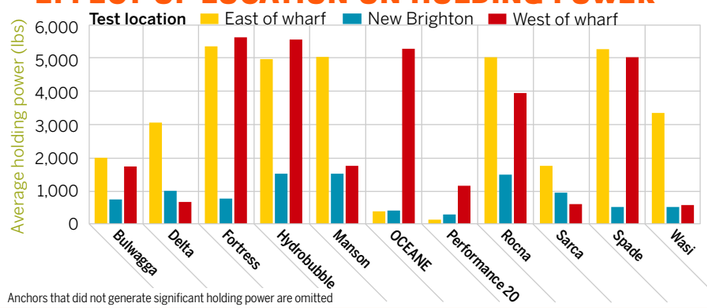
www.rocna.com

The Rocna is very similar in design to the Manson, but the Rocna yielded slightly better results. Both withstood maximum pulls east of the wharf and had similar holding power on both 5:1 and 3:1 scope; the Rocna held slightly longer east of the wharf before releasing. Like the Manson, the Rocna, with its sharp point and roll bar, was one of the better-performing designs we tested; it has similar potential drawbacks, such as how much it would protrude on a bow roller and potential pulpit conflicts. However, the Rocna's blade was more angular and had slightly upturned flaps at the back, and its shank was slightly longer. These subtle differences might explain the Rocna's slightly better test results.

## EFFECT OF SCOPE ON HOLDING POWER




## EFFECT OF LOCATION ON HOLDING POWER




Anchors that did not generate significant holding power are omitted


# SPADE ::

WEIGHT: 35 LBS › PRICE: $450

SPADE ANCHORS › 800-262-8464

www.spade-anchor.com

The Spade turned out to be one of the better-performing anchors on 5:1 scope. Multiple pulls at both wharf locations yielded 5,000-pound load readings. Its simple weighted point and mid-sized blade easily penetrated and held without dragging. Results fell off dramatically, however, at 3:1 scope and at the New Brighton location. Our beach pulls illustrate why the Spade was so successful. The heavily weighted point immediately dug in and nearly buried not only the blade, but the shank as well.

# SARCA ANCHORLIGHT ::

WEIGHT: 33 LBS › PRICE: N/A

ANCHOR RIGHT › 604-322-4008

www.anchorright.net

The Sarca was unlike any of the other anchors we tested. It consists of a large triangular blade, a pronounced roll bar, and a hollowed-out shank that allows the shackle to slide forward during retrieval. Its very sharp point (it could cut you if you weren't careful) was well suited to penetrating the hard-pack sand. On every 5:1 pull at all three locations it set quickly and held up to 3,000 pounds. The data shows it consistently held between 1,500 and 3,000 pounds before releasing. Similar numbers were recorded after the 3:1 pull. These setting characteristics deserve a high rating. However, several other anchors we tested set with similar consistency and held at higher loads.


# WEST MARINE PERFORMANCE 20 ::


WEIGHT: 26 LBS › PRICE: $200

WEST MARINE › 800-262-8464

www.westmarine.com

The Performance 20 is a Danforth-style anchor marketed by West Marine, so when we were consistently unable to get the anchor to set at a variety of scopes and locations, there was considerable scratching of heads. For the majority of pulls on increasingly longer scope, the anchor seemed to set and release quickly. Several pulls showed brief spikes, then a quick release. It also briefly held 1,500 pounds on 5:1 scope before slowly dragging and releasing off New Brighton. But that was only one pull of many—hardly enough to show the anchor is capable of holding anything close to that much load dependably. The Fortress showed how effective a Danforth-type anchor could be, so the only explanation the team could come up with was that the flukes of the particular anchor we tested weren't sharp enough to penetrate the hard, claylike sand.


# WASI ::

WEIGHT: 32 LBS › PRICE: $730

SWISS TECH AMERICA ›

408-505-7245

www.swisstech-america.com

The stainless-steel Wasi has a roll bar like some of the other anchors we tested, but its blade and shank design are unusual. The blade consists of a flat, heavy triangle, and the shank angle is very pronounced. This angle appears to provide the downward force required to propel the flat blade down into the bottom, and test results show it works. The Wasi set quickly on 5:1 scope, held to 3,000 pounds, and dragged before releasing when the load topped 4,000 pounds. Results were similar on 3:1 scope.

# XYZ ::


WEIGHT: 12.5 LBS › PRICE: $395

CREATIVE MARINE › 800-824-0355

www.creativemarine.com/xyz.htm

The XYZ anchor was by far the most innovative design we tested. Weighing in at only 12.5 pounds, its holding ability depends solely on how well it can dig into the bottom. The shank is also equipped with a knob that insures the XYZ will flip over if it lands upside down on the bottom. On the beach it flipped over and dug a long trench in the wet sand. But, no matter how hard we tried, we could not get the XYZ to set in any of our tests. We recorded intermittent readings that maxed out at about 300 pounds, but we were never able to get a legitimate set at any location and on any amount of scope.

# CONCLUSION ::

After three full days, over 100 test pulls, and countless hours crunching numbers and analyzing data, we learned a great deal about all the anchors we tested and about the challenges of anchor testing. Having several anchors with established reputations fail to set sparked many hours of debate. We questioned our methodology and tried to determine what could be done to insure that all anchors could at least return some results apart from "did not set." It's possible the size and power of the *Shana Rae* could have been too great to get accurate readings on some anchors. (Hawley and his team were able to get all the test anchors to set using a smaller, less powerful boat in a separate test.) The anchors that returned poor results in our test may produce better results in different conditions.

In the end, we were surprised that the CQR, Claw, XYZ, and Performance 20 performed poorly in our test and were impressed with the results of the new sharp-point/roll-bar designs, along with the Hydrobubble and the Fortress. Anchor design is evolving, but our results still confirm the rule of thumb that every boat should carry at least three different anchor designs and weights to deal with a wide variety of bottom types.