



Some cruisers unwittingly destroy with anchors and chain rodes the coral treasures that lure them to the tropics.

(Above): In the lee of Pacific islands, dark patches on the bottom are likely to be coral reefs. This is Kapa Island, Tonga. (Inset): Coral reefs provide habitats for thousands of species of marine life.



"OK!" The man waves his hand backward, while peering down into the clear water at the reef below. "OK, OK!" He hollers, arm pin-wheeling. "Reverse!" The woman at the wheel levers the big cutter into reverse and gooses the throttle. Twenty tons of vessel move backward, with increasing speed.

The coral patch with the anchor in its midst is perhaps 1,200 years old. The individual corals are much younger, the oldest being a large beige *Porites ras* about 200 years old. It looks like an enormous crystal castle grown in an otherworldly science fair project. The fish on the reef are all much younger, perhaps the oldest a large grouper who lives under the big yellow *Porites lutea*. It might be 40 years old.

There are thousands of species of marine life on the patch reef: Microscopic Foraminifera of delicate red colors, thousands of little seashells, feather stars, crabs, shrimp, sea urchins, fish, and on and on. The reef is not just an exquisite place for them, the reef is them.

The anchor chain slices backward, ripping the delicate coral branches to rubble. A loop catches around a big yellow coral head and 20 tons of yacht bite down and yank the head off its foundation, sending 89 years of delicate growth spinning through the branches of the old *Porites rus* colony. The chain rips back and down, grinding deeper into the colony.

Finally, the chain pays out all the way and the 60-pound plow whips around. The kinetic energy of the yacht, now surging backward at two knots, hammers the chain down and, when it hits the embedded anchor, the entire seaward side of the 200-year-old coral colony explodes outward. The anchor buries in the sand and stops the backward drive of the yacht.

"OK!" the man on the bow yells. "She's holding!"



In seconds, an anchor can destroy coral growth that took hundreds of years to form.



Full reef growth such as this not only is endangered by transient cruisers, it also is threatened by local subsistence fishermen.

This scene was enacted in a little bay on the leeward side of Kapa Island in the Vava'u Island Group of the Kingdom of Tonga. The boat was one of 600 cruising yachts and yacht charters that stopped and anchored in the bay in 1989. All of the boats were crewed with nice folk who came to enjoy the beauty of nature, the wild, unspoiled wonderland of shallow water coral reefs.

At the bar at the Paradise Hotel, the old hands returning for the second or third time to Vava'u drank their beers and talked about how much nicer the reefs were "the last time we came through."

I was alarmed that those contributing to the escalating and serious destruction of the precious living coral communities of the Pacific were unaware of their role in it. When I mentioned that yacht anchors and chains damaged the reefs, the conversation ended.

Some people were offended. Others were momentarily thoughtful, then embarrassed. Time and again I have explained to crews of yachts anchored in coral what their anchors and chains are doing. Usually they are surprised, and they move and anchor properly in sand. Most cruising people come from temperate areas where their training does not include coral reef anchoring. In New Zealand, California, Europe and southern Australia, for example, cruisers often drop anchor upwind of rocks in the hopes that they will help hold the anchor.

Just as a person can sustain and heal a cut, so coral has remarkable powers of regeneration. But if a person is cut again and again, day after day, the chances of getting a bad infection increase and, inevitably, a constantly abused body will become sick and die. When a coral reef ecosystem is abused day after day, week after week, diseases and coral predators become more common. The worst disease is caused by a cyanobacteria called *Oscillatoria*. It looks like a fine bluegreen hair growing in the damaged coral tissue. Under constant abuse the disease gets epidemic and any coral breakage will cause instant infection. The coral head will die within a few months even if no more damage is sustained.

Here in the Pacific there is a big ugly starfish called the crown of thorns, which can grow up to two feet in diameter, comes in red, green or gray, has 16 to 18 arms and is covered with long, super-sharp poisonous spines. It eats coral by extending its stomach over the colony and ingesting the little coral animals with its little coral cups. It happens that the crown of thorns is attracted by the juices of broken coral and so, in many anchorages, you can find them happily digesting the last living polyps of broken pieces of coral around anchor chains.

By making life rosy for these starfish - bringing them together where they can reproduce - the yachts contribute to their breeding success and each year there are more of them to eat more coral. In some islands, the crown of thorns has become epidemic and has savaged vast areas of coral reefs, leaving behind a desolate seascape. Cruisers give an additional boost to this creature by collecting triton shells - triton shells eat crown of thorn starfish.

Not only are coral reefs around islands being abused daily by yachts, they also are under siege by island people during subsistence fishing. This subsistence abuse - year round reef bashing - probably is the root cause of the Pacific-wide decline of coral reef habitats. Islanders, too, pick up triton shells and kill fish that help keep crown of thorns populations in check.

While many people are trying to solve this problem, the International Reef Wreckers really don't help. Aboard the yachts are people who can cruise in vessels that often cost more than most island people can begin to imagine. The cruisers are educated, literate, concerned. These are people who love nature, the sea, and the wildness and purity of the oceans. Surely, they cry out for education.

But why would one want to anchor in coral, anyway? Coral is poor holding ground. Most anchors are built to hold in sand or mud but not in coral. A chunk of coral can foul a plow or a lightweight type so it won't hold at all, even when it drags out into sand. In protected bays, coral is brittle and not very strong. While the anchor may seem to be holding fine, if the wind suddenly switches and begins to blow hard, you can expect the anchor to come loose and deposit your boat onshore.

If you plan to cruise in coral islands, you should have (1) a good electric or hydraulic power anchor windlass, (2) a recording type depth-sounder (or at least a good echo-sounder) and (3) a tender with a powerful outboard motor.

You'll need a good power windlass because the best place to anchor in coral-type environments is in deep water. In fact, in many Pacific and Caribbean coral areas, you'll find there are only two water depths, very shallow and very deep. Seldom is the shallow water deep enough to anchor in, but you might find a ledge in 20 to 30 feet. Most of the shallow water areas and the slope between the reef and the lagoon deep will be overgrown with corals. The more protected anchorage, the more brittle and delicate coral will be and the more likely your anchor will foul.

A recording depth-sounder will let you see if you are over coral (you don't need this in shallow water because you can just look over the side and drop the hook into the sandy areas if you can find one). Coral can grow just fine in depths up to 150 feet, providing the water is clear enough. In general, however, in depths over 120 feet most anchorages have no coral. If your echo-sounder is not a recording type, one way to see where it's safe to anchor is to watch the depth-sounder as you drift

back from the shallow reef ledge. The bottom will fall away quickly and then level off. Where it's level, it's probably nice sandy mud and a good place to drop the hook.

Sometimes, however, there will be coral down there in the deeper water and that's especially bad because it will be very brittle and can foul your anchor. If the anchor chain "rumbles" when you start backing down, you are in coral. Move ahead, pulling up chain until the anchor is just off the bottom, then move back a ways and drop it again until it hits bottom. If it rumbles, pick it up and back down some more. Needless to say, you can't do this with a hand windlass. Rarely, have I had to search several areas of an anchorage to find flat, sandy mud. But, if necessary, I will.

If your boat won't carry the 400 feet of chain needed for anchoring in some Pacific lagoons, use chain and rope. But remember that 300 feet of chain in 100 feet of water provides a tremendous catenary weight. When the boat tries to pull that much chain straight, it provides a substantial shock absorber. I have stayed rock steady in 60-knot winds with only a three-to-one scope (360 feet of chain in 120 feet of water), You won't get that advantage with rope, which will need five-to-one for most conditions and seven-to-one for storm conditions.

Also, with rope, you will have an enormous swinging circle and you must be careful that the boat does not swing back onto the reef slope where the line might foul in the coral and be cut. Putting a float on the end of the chain where the rope begins won't work too well when there is a steeply sloping reef close to you.

I don't use a rope rode because each time you lift anchor you have a big pile of it on deck. All I do is step on the little button and my Nilson 3000 vertical windlass winds the chain right into the chain locker. I've heard people say, "Yeah, but what happens when you step on the button and nothing happens?" I can't answer this because, in the 14, years I have been using it, it has never failed me. I do, however, keep a spare electric motor and button just in case.

The third piece of mandatory equipment is a good tender with a serviceable outboard, which will give you more flexibility as to where you can anchor. I am constantly amazed at people who venture out here with dinghies barely fit for going from one boat party to another.

With an adequate support boat (a minimum tender would be a 10-foot inflatable sport boat with built in transom, sturdy floor and 7.5 horsepower outboard), you can anchor where you like which, hopefully, will include spots where there is no coral. Case in point: In the main harbor of Vava'u, there are three nightclubs up on the top of the harbor cliffs. They like their music loud and of the lowest possible caliber. The Paradise Hotel speakers are almost six feet high. Most yachts, having inadequate tenders, find themselves serenaded until 2 or 3 a.m. as they have to anchor right next to the hotel. When it really gets' rocking on Friday nights, we can barely hear it because we are about a mile away at the other end of the harbor. In my 13-foot Avon with a 30-horsepower Mariner, I can get to the wharf quickly and easily, whether anchored out in 130 feet of water or over in the next bay - away from the racket or from the precious coral habitat.

There is a final danger about anchoring in coral: anchoring restrictions. In some New Caledonia marine reserves the government has put moorings out in popular reef areas to prevent anchor damage to the coral. Out here in the Pacific most island governments don't have the time, money or inclination to put moorings out for the satisfaction of passing yachts. They are, however, concerned about the damage yacht anchors cause to their reefs. Their simple solution is to restrict yachts to the main anchorage or marina.

If you want to go out to the glorious little beaches, bays and wonderful reefs, you can pay to go in local boats with the other tourists. Or you can go by bus to the beaches that are set up to handle tourists. Or, you can invest in an inflatable sport boat as your tender and zip out to other anchorages.

Don't anchor in coral. Before you go cruising, get the proper gear to anchor your yacht in deeper water. If you see a yacht moving into the coral gardens to anchor, politely explain why they should anchor elsewhere, in sand. If the yachting fraternity won't police itself, it will punish itself.

Dr. Richard Chesher has been cruising aboard his own research vessels working on coral reef ecosystems since 1958. He has sailed the Pacific, trying to stem the slow decline of coral reef

habitats, since 1969 when he was chief scientist for a U.S. Department of Interior survey of the crown of thorns starfish. He is presently in the Kingdom of Tonga working with the government on reef restoration and reef protection programs.

The Coral Cruiser's Rules

- ✓ Don't anchor in the living coral; anchor in sand.
- ✓ Carry sufficient chain or chain and line to anchor in 100 feet or more. Most anchorages are free of coral in depths over 100 feet. - Carry a good depth-sounder, preferably a recording model that will show the difference between sand and coral.
- ✓ If the bottom isn't visible and you don't have a depth-sounder, remember that if the anchor rode "grumbles," it is in coral. Lift it clear of the bottom, drift a little and try again.
- ✓ Direct other cruising boats to sandy, non-coral anchorages.
- ✓ When a boat is anchored in coral, explain to its crew that coral is a living creature and very delicate, and that anchors and anchor chain do much harm.
- ✓ Spread the word about careful coral cruising - person-to-person and over the ship's radios:
- ✓ Inform race committees to issue special coral anchoring notices to all entrants of races bound for tropical island environments.
- ✓ When you charter, make sure the charter agency informs all patrons not to anchor in coral.
- ✓ Photocopy this sidebar and post it on yacht club bulletin boards at home and wherever you cruise among coral reefs.