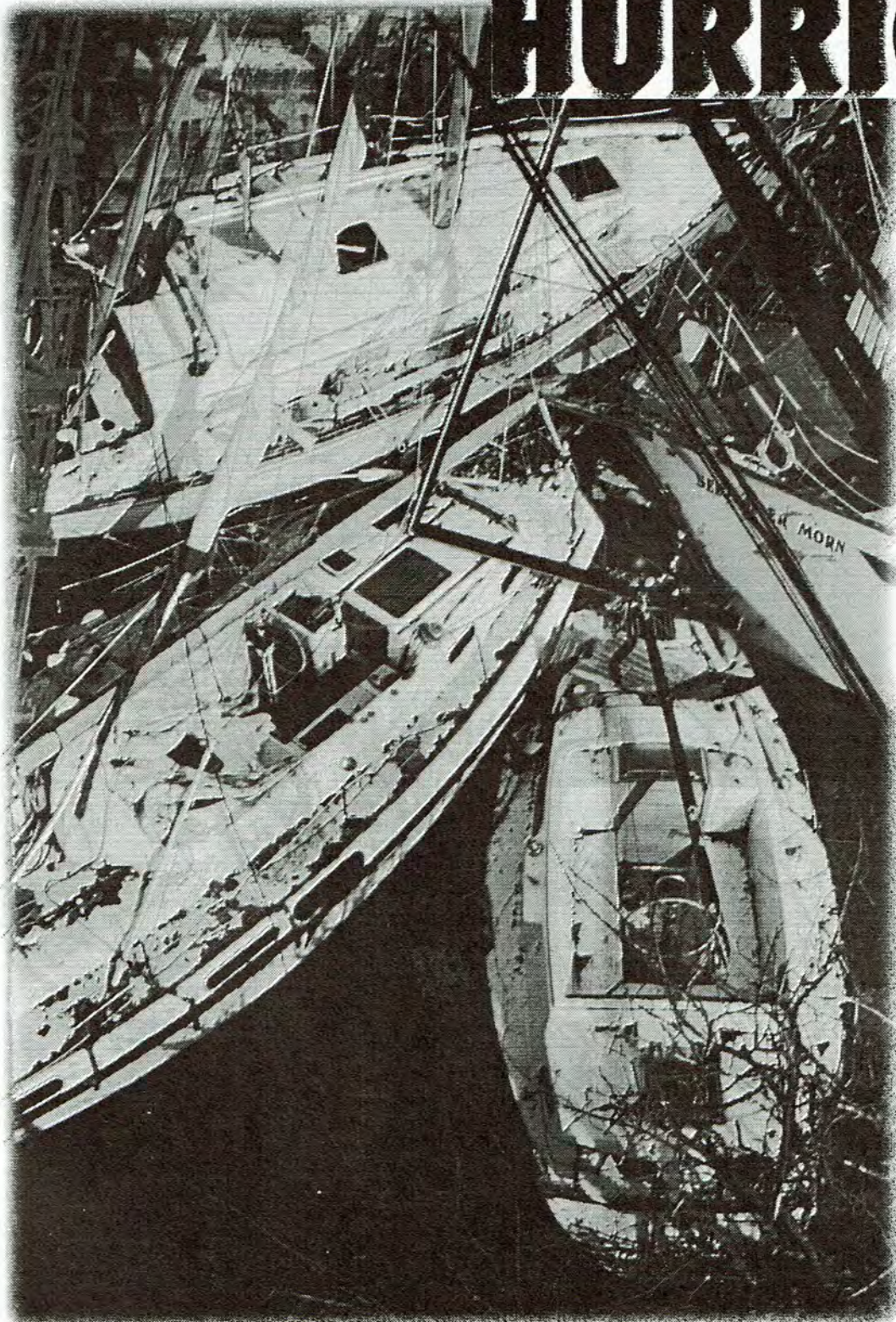


**HOW TO PREPARE
YOUR VESSEL TO**

SURVIVE A HURRICANE

**IN THE
U.S. VIRGIN
ISLANDS**



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FOR VITEMA, THE VIRGIN ISLANDS TERRITORIAL EMERGENCY MANAGEMENT AGENCY

INTRODUCTION

This is not a booklet about hurricanes. This is a booklet about how to prepare your recreational vessel to survive a hurricane in the USVI. It is based upon the actual experiences of many different cruising sailors who have survived a multitude of major storms right here in the VI. It contains many harsh lessons and strong statements—because the reality of surviving a hurricane afloat is a grim one.

Hurricanes are our planet's **Ultimate Storms**. They are almost unimaginable in their destructive power. Houses are blown away. Giant buildings collapse. Cars fly. Glass explodes. Beaches erode. Trucks tumble. Breakwaters crumble. Trees snap. Docks disappear. Waves crash. Boats sink... ..and, occasionally, someone dies.

That's the grim reality. All seven fatalities in the USVI during Hurricane Marilyn were boaters.

There are five main elements to hurricane survival: safe harbor, careful preparation, proper anchoring gear, adequate knowledge on how to deploy that anchor gear effectively, and luck. If any of these five elements are missing, your vessel will probably be driven ashore, severely damaged and/or totally destroyed.

This is the plain, unvarnished truth. Your vessel will probably *not* survive a direct hit by a hurricane. We regret to inform you of such bleak facts, but the truth is statistically clear. *The majority of recreational pleasure craft do not survive direct hits.*

If you doubt this, just look at the survival rates of yachts anchored in St. Croix, Culebra, St. Thomas, and/or Sint Maarten during such recent hurricanes as Marilyn,

Luis, and Hugo.

Or check out what percentage of recreational craft made it through Hurricane Andrew in South Florida—or through Hurricane Hugo in Charleston, South Carolina.

Many well-known harbors, filled with seemingly 'storm-ready' offshore cruising vessels, were literally wiped clean by the storms. Some of the best 'hurricane-proof' harbors in the Caribbean had fleet survival rates of less than twenty percent during Hugo and Luis.

Those aren't good odds.

The only way to absolutely guarantee that your vessel will not be lost or severely damaged in a hurricane is to not allow it to be in one.

However, it *is* possible to greatly increase your chances of hurricane survival afloat—if you work at it effectively.

But it's complicated.

Thus we write this booklet. If just one person or just one vessel survives because of our feeble literary efforts—then all our laborious inkslinging will have been worth it.

If you are reading this as a major storm approaches, don't despair. You are in imminent danger, but your chances of survival are relatively good *if you properly prepare your vessel.*

Major hurricanes *can* be consistently survived at anchor with only minimum damage to your vessel. There are many local vessels which have survived numerous hurricanes down through the years—and your vessel can join the growing list.

How?

In a word, *preparation.* √√√

SEVERE WEATHER TERMS

Hurricane Season: June 1 to November 30

Tropical Wave: a weather system which might develop into a tropical depression.

Tropical Depression: a circulating storm system with winds of less than 38 mph.

Tropical Storm: a circulating depression with winds between 39 and 73 mph.

Hurricane: a tropical cyclone that rotates counterclockwise with sustained winds of 74 mph or greater.

Tropical Storm Watch: a tropical storm may strike within 36 hours.

Tropical Storm Warning: a tropical storm may strike within 24 hours.

Hurricane Watch: a hurricane may strike within 36 hours.

Hurricane Warning: a hurricane may strike within 24 hours.

Hurricane Advisory: a message released by the National Hurricane Center, usually at six hour intervals. A *special advisory* is issued whenever there is a significant change in the situation. An *intermediate advisory* updates information on a 2 to 3 hour basis.

Storm Surge: a rapid rise in water level as the center of the eye approaches.

Hurricane Eye: an area of relatively calm air at the center of the storm. The closer you are to the 'eye' of the storm, the higher the winds and the lower the barometric pressure.

Saffir/Simpson Hurricane Scale

Category I	74-95 mph
Category II	96-110 mph
Category III	111-130 mph
Category IV	131-155 mph
Category V	156+ mph



WHAT IS A HURRICANE?

A hurricane is a large low-pressure cyclonic storm system which rotates counter-clockwise (in the northern hemisphere) and contains sustained winds of over 74 mph (approximately 64 knots).

Hurricanes usually contain torrential rains, and are often accompanied by severe flooding and numerous small tornadoes. In addition, hurricanes contain a huge dome of water called a 'storm surge' which is a major cause of damage to low-lying coastal areas.

This storm surge is not to be underestimated. In the United States, nine out of ten hurricane deaths are caused by it. In 1970, when a Category Five hurricane slammed into Bangladesh, 300,000 people died as a direct result of its massive surge.

Tropical hurricanes are truly massive energy systems. In a single day, even a small hurricane produces more energy than most European nations consume in a year.

Hurricane winds can exceed 200 mph. They can also build in strength quickly—one rapidly growing storm system increased by 85 knots in a single day.

Rainfall amounts can be as high as 36 inches in 24 hours. One hurricane in 1928 dumped *two and a half billion tons* of water on Puerto Rico. In 1979, Hurricane Claudette poured 45 inches of rain on Alvin, Texas.

Barometric pressure within the eye can be less than 27 inches.

The waves created by these massive storms can approach 100 feet in height. The wrecks of large ships sunk in over a hundred feet of water have shifted their position on the bottom during hurricanes.

In Deshaies (Guadeloupe, FWI), large cement mooring slabs resting in forty feet of water were tossed on the beach *despite no vessels being attached to them* during Hurricane Klaus.

There have been 263 recorded full-fledged hurricanes between 1950 and 1995. In 1995, there were 19 tropical storms and hurricanes.

Hurricanes vary greatly in size, and are between 25 and 300 miles wide. The center (called an 'eye') averages 15 miles in

diameter, but can be as wide as 50 miles (and 50,000 feet in elevation). Forward speed averages between 10 and 15 knots between Africa and the Caribbean, but can speed up to between 25 and 50 knots.

Winds over 35 knots can last for over two days as a storm passes slowly overhead. In 1971 Hurricane Ginger lived for 28 days in the Atlantic before blowing itself out.

The destructive force of a hurricane is

difficult to imagine. For instance, as wind speed doubles, its 'pressure' or force quadruples.

Example: stick your head out of a moving car speeding along a highway at 50 mph. Feel the force on your face. It's fairly strong, isn't it? Well, your face would have *sixteen times that amount* of force on it if you stuck it out of a stationary car window during a very strong hurricane. √√√



STORM ROTATION

If you face into the wind of a hurricane, its 'eye' can be roughly pointed at by extending your right hand 90 degrees from the wind. You are now pointing almost directly at the center of the storm. Also, if you view your right fist from the top (thumb end up), then a hurricane's wind will rotate in the direction your curled fingers point, counter-clockwise.

Many people find it easier to visualize a storm's rotation with the help of a couple of simple household props. Get two circular objects, one large and one small. On the large circle (dinner plate, coffee can plastic top, garbage can lid) draw a number of arrows around its rim, pointing in a counter-clockwise direction. Next, take a penny out of your pocket and place it on a table.

Rotate the large circle (the hurricane) in a counter-clockwise direction while slowly passing it over the penny (island). See how the winds would veer during a north pass? South pass? Direct hit?

The direction of rotation of a hurricane is a very important concept for a Virgin Island sailor to grasp. If you don't know a hurricane's projected path or how it rotates, you will never be able to predict how its winds will veer—one of the most important aspects of storm survival for the mariner.

If the eye of a hurricane passes overhead, winds will clock through 360 degrees. There will be a period of relative calm within the eye which might last for a few seconds or a few hours, depending on the location, size and velocity of the storm.

If a westward moving storm strikes the Virgin Islands dead-center—winds will start

out gentle from the north, build gradually to the arrival of the eye, and suddenly change 180 degrees to the south at full strength, and gradually diminish.

If a northward moving storm strikes the Virgin Islands dead-center—winds will start

overhead is *very* stressful on anchor gear.

If a westward moving storm passes just south of us—winds will start out north, veer gradually to the east, then continue veering to the south after the eye begins to leave the area.

During a north pass—winds will clock north, northwest, west, southwest, south.

Hurricanes are generally more destructive if they pass just to the south of us, rather than just to the north. Examples: Hurricane Hugo and Hurricane Marilyn passed close to the south of St. Thomas. The result was major damage. Hurricane Hugo passed directly over St. Croix and Culebra, and the level of destruction was even greater. However, Hugo passed to the north of San Juan, and damage was not nearly as severe there.

Why is the destructive force of a hurricane more if it passes to the south and less if it passes to the north? Answer: because the wind strength will vary significantly. Example: Let's say a stationary hurricane is packing 100 knots wind. Then let's say this hurricane begins to move westward at 20 knots, and passes between

St. Croix and St. Thomas.

St. Thomas would experience almost 120 knots of wind, while St. Croix might get a little over 80. That's a very significant 40 knot difference.

Thus, large commercial vessels in mid-ocean always steam away from the 'danger quadrant' of a hurricane (the side which the wind rotation and forward direction reinforce each other) as fast as possible. √√√



out gentle from the east, build gradually to the arrival of the eye, suddenly change 180 degrees to the west at full strength, then gradually diminish.

This 'direct hit' is the worst-case scenario for a number of reasons. The maximum winds are found at the *wall of the eye*—as are the greatest number of tornadoes and the highest storm surge. In addition, the sudden 180 degree wind shift as the eye passes

HURRICANE SEASON

Hurricane season is generally considered to be from June through November. From the middle of August to the middle of October seems to be the busiest period for our area. Hurricanes can, however, form during any month.

Not too long ago, vessels anchored off St. Barths were forced to spend Christmas Eve in the Simpson Bay Lagoon in Sint Maarten—hiding out from Tropical Storm Lily.

HOW VI HURRICANES ARE BORN

Recent devastating hurricanes such as Marilyn, Luis and Hugo began their lives as 'tropical waves' over the sun-baked continent of Africa. Once these large weather systems drifted westward over the warm open waters of the tropical Atlantic, they began to slowly intensify.

With a forward speed of between five and fifteen knots, they leisurely headed out to sea, steering almost straight west between 8 and 12 degrees Latitude North.

During this period, their 'eye' (center) began to form, they began rotating counter-clockwise, and their winds began to intensify. At this point, they were referred to as *tropical depressions*. Once their winds exceeded 33 knots, they became *tropical storms*.

As they approached the Caribbean Sea, they turned slightly more northward, and roared through the Lesser Antilles somewhere between Guadeloupe and Sint Maarten—before smashing into the Virgin Islands.

This is the *classic path and development* of hurricanes which normally threaten our area.

The Virgin Island's marine community generally hears (via commercial radio broadcast or NOAA weather radio) about a tropical wave which *might* develop into a hurricane—around four to eight days before its arrival in the Territory.

Within 72 hours of its expected arrival, NOAA forecasters have a *rough* idea of the swath it *might* carve through the islands.

A *hurricane watch* is issued by the National Weather Service within 36 hours of its possible strike, and this is updated to a *hurricane warning* within 24 hours of its arrival.

However, this classic path and development is not, alas, always the case. Hurricane Klaus formed south of Puerto Rico, and then confounded all the experts by heading *northeast*. Some hurricanes have

been issued. (This is rare, but it *can* happen.)

This is what makes tropical hurricanes so unpredictable—and thus so dangerous.

If all of the above wasn't confusing enough, here's another factor to consider—during the height of hurricane season, occasionally two large storm systems move across the lower Atlantic at the same time. They can actually begin to 'bump' and 'rotate' around each other—creating a double-wide swath of destruction. This is known as the *Fujiwhara Effect*.

Needless to say, this 'bumping' makes their eventual individual path prediction even more of a 'naviguers' game.

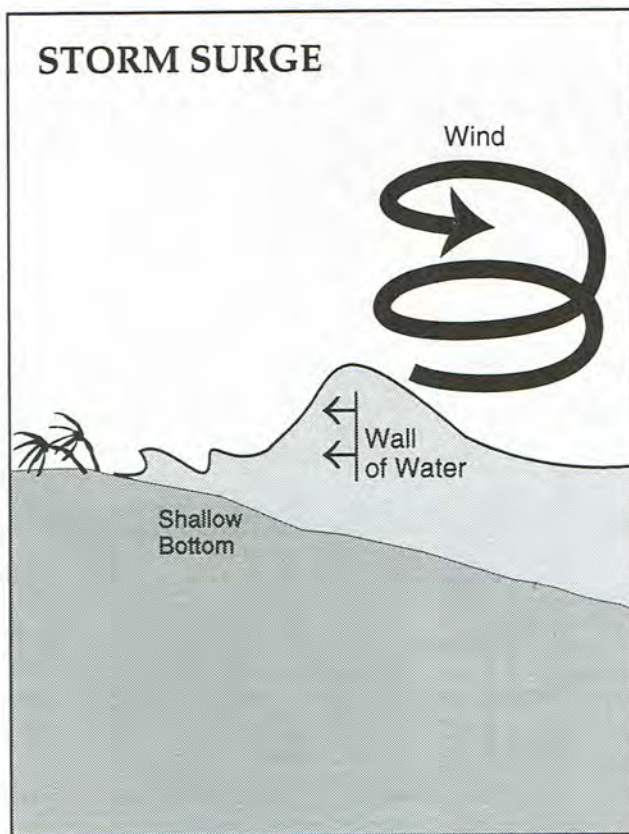
THE STORM SURGE

This rapid rise in sea level can be *up to twenty four feet high* as the eye of the storm passes overhead. (Usually it is between five and twelve feet here in the Virgin Islands. The highest recorded storm surge took place in Australia in 1899, when a 42 foot high wall of water hit the coast.)

This storm surge causes a number of severe problems. 1.) It dramatically lessens your anchor rode scope. 2.) It might snap any dock/mangrove lines you have running ashore. 3.) It might set your vessel *upon* a dock or seawall, rather than alongside it. 4.) Such a massive amount of water moving so quickly in-and-out of a protected anchorage will create a *tremendously* strong current—adding to the already massive strain on your anchor gear.

5.) The rapid rise of water can put seawalls, breakwaters, and sandspits so far underwater that they suddenly offer little storm protection from the wind and waves—just when you need it most.

The storm surge is one of the least understood and most dangerous aspects of a hurricane. Not taking its deadly effects into account usually ends in disaster. √√√



even doubled back on their course, and hit the same area twice.

The forward velocity of a hurricane is hard to predict. Some stall and remain almost stationary, while others suddenly speed up to over 50 knots.

Hurricanes can literally form directly over the Virgin Islands—and begin effecting us only hours after a hurricane warning has

STAY ABOARD OR ASHORE?

We do not recommend staying aboard your vessel during a storm. Let's face it—a boat, no matter how wonderful, is just a material possession. All the recreational vessels in the world are not worth a single human life.

And staying aboard is *definitely* dangerous. All seven fatalities in the USVI during Marilyn were boaters.

However, we must admit that the majority of live-aboard boaters in the Virgin Islands have traditionally stayed aboard their boats.

They believe staying aboard increases their vessel's chances of survival. There are, undoubtedly, instances when this is true. A skipper can veer out more scope, chop away entangling anchor rode, run their engine, and/or steer their vessel to a 'soft' landing if he or she is aboard.

But the risk is great, and the most sensible course of action is to prepare your vessel as completely as possible, and then go ashore.

Note: if you decide to stay aboard, do not change your mind later and ask for outside assistance. It is one thing to deliberately place your own life in danger, it is quite another to request that someone else risk theirs.

HURRICANE WARNING FATIGUE

We've seen this happen a number of times. A new vessel cruises into the tropics, and its crew fully prepares for the first three or four hurricane scares of the season—and then begins to get lax.

When a real hurricane finally does hit, they haven't even moved from their regular anchorage—because they were so tired and discouraged from responding to so many 'false alarms'.

Don't let this happen to you.

The secret to avoiding 'hurricane warning fatigue' is to have to a 'two-tiered' approach to storm preparation.

At the earliest possible moment when any hurricane threatens, move immediately to safe harbor and pick your spot.

Then relax. Do nothing. Chances are, the storm is going to be a false alarm. The vast majority of times you move, you've really

moved for nothing.

When the storm eventually misses, be on your merry way. You've lost only a little time and energy.

And if the storm *does* look like it is going to strike, you should have plenty of time to get all your preparations completed—IF you moved early.

WHEN TO SEEK SAFE HARBOR

Deciding when to seek 'safe harbor' is a lot like deciding when to reef your sails—if you think you should, you're probably already late.

Seek shelter as early as possible. Don't delay. There are a number of good reasons for this.

The #1 reason is there are usually a lot more boats seeking safe harbor than there is quality space.

The Virgin Islands have enough room to safely tuck away three or four hundred well-prepared cruising vessels—while over a thousand vessels are home-ported in our waters during your average month of September.

The only way to consistently secure a good spot is to move early and often... or, better yet, *stay* near a hurricane hole for the most active period of the season.

In addition, you have a moral responsibility not to be a late arrival. An ill-prepared, late-arriving vessel puts *all* the other vessels in the area at risk. So don't be late—or you will be greeted with scorn and anger by your normally friendly fellow boaters.

DISPELLING MYTHS

Myth #1 — Weak Hurricanes

There is no such thing as a 'small' or 'weak' hurricane. This is literally a contradiction in terms. Dismissing the threat of a Category One hurricane makes about as much sense as not worrying about getting shot with a small caliber handgun.

Hurricanes are, by definition, the most powerful storms on this planet. Don't allow

anyone to convince you otherwise. Any approaching hurricane places you and your vessel in immediate, grave danger.

Myth #2 — Path Prediction

While we are very good at sensing the existence of hurricanes and tracking where they have been, we are still very poor at predicting their path.

We repeat: modern hurricane path prediction is a wildly inaccurate guessing game, and all such predictions should be taken with a grain of salt.

In 1995, Hurricane Iris was predicted to hit Tortola dead-center. It veered at the last moment, and the storm-ready fleet was literally becalmed instead of savaged. A few weeks later, a 'small tropical storm' was predicted to miss St. Thomas—instead the eye passed close to its western edge, packing 130 knot gusts and sinking almost every vessel in its major harbor.

Myth #3 — Heading Out to Sea

Don't even consider it. This makes about as much sense as playing Russian Roulette—you might 'get lucky' a few times, but over the long run you are committing suicide.

The fact is that most recreational sailing craft are not safe at sea during a hurricane. In 1995, *dozens, perhaps hundreds*, of craft in the Lesser Antilles were blown out to sea during hurricanes, and not a single one survived that we're aware of.

'Running' from a hurricane isn't a reasonable strategy if you cannot be sure which way it is heading—and you never are. Plus, it would require immediately heading out to sea *whenever* a hurricane was approaching your area... which was about six to eight *continuous* weeks in 1995 if you happened to be cruising in the Virgin Islands.

Going to sea as a storm approaches should only be attempted by professional mariners on large commercial vessels which normally spend most of their time at sea.√√√

PREPARING FOR HURRICANE SEASON

By the beginning of June, all Virgin Island boaters should have a hurricane preparedness plan. Putting this plan in writing is an excellent idea, especially if you might be away during some portion of hurricane season. (The person you designate to watch your vessel will surely appreciate having a written copy in the event of a hurricane warning.)

The written plan can be as elaborate or simple as you desire. The important thing is that you decide *in advance* where you are going in the event of a storm, and what you are going to do once there. (A basic *hurricane plan form* is included at the back of this booklet.)

If you keep your vessel at a marina, check with the manager about its hurricane policy. Most local marinas will not allow you to stay at their docks during a storm. Other marinas allow their regular customers to stay, but do not accept 'storm' guests. Still other marinas *might* allow non-regular vessels to use their facilities during a storm, but usually by prearrangement only.

In any event, check your marina's policy well in advance of hurricane season.

The best possible way to make your hurricane plan as accurate and helpful as possible—is to actually do a test run.

Go down to your boat and move it to your chosen hurricane hole while timing its passage. Once there, leisurely survey the area, paying attention to your depth gauge and as many other factors as possible.

Then pick a likely spot to anchor. In which direction would you deploy your gear? How? Why? How would the wind clock during a direct hit—or a north or south pass? Does this spot offer maximum protection from both wind and seas? What would this area be like with a ten foot storm surge? If there was a strong current in the anchorage, which way might it ebb and flow?

If your vessel was driven ashore, would it have a chance of survival? If you plan on staying aboard, how would you attempt to swim/scrabble ashore if your vessel sank?

A couple of hours spent mulling over such details on a sunny Sunday afternoon

might pay off handsomely.

Obviously, just a good plan isn't enough. Your vessel and its anchor gear must be up to the challenge as well.

Mechanically, your vessel should be in tip-top shape. Having a dead battery or a malfunctioning bilge pump could be fatal during hurricane season. You should go over your vessel's engine, rig, plumbing, communication equipment, lighting, and electrical systems with a fine-tooth comb. Check to see that all your cleats, bits, and chocks are still in good shape.

Make sure your boat is neat and shipshape, and the bilges are clean. Check the strum boxes (strainers) on your bilge pumps. In an emergency, you don't want your bilge pumps to quit when you need them most.

Now is the time to fix any problems, not when the wind starts piping up to 100 knots!

In addition to your regular gear, make sure that you have plenty of flashlights, fuel, and emergency supplies. (See the check list in the lower right hand corner of the Hurricane Preparedness Plan at the back of this booklet.)

Don't forget your foul weather gear, waterproof boat shoes, life jackets, and dive

mask. Make sure your VHF radio works, especially on the NOAA WX Channel (3).

Keep your ship's papers (including insurance policy and vessel inventory sheet) in a waterproof pouch that is easily accessible. Make sure that your marina, your family, your 'designated boat watcher', and your vessel all have current copies of your hurricane plan.

If you leave the boat before or during the hurricane, make sure you bring your ship's papers with you.

If you are off-island during hurricane season, make sure the person in charge of your vessel is aware of all these facts. They are doing you a huge favor—so make sure everything goes as smoothly as possible for them.

Also, make a list of things you should remove from your vessel just before a storm. You won't need your binoculars, sextant, fishing poles, Walkman, and TV aboard anyway.

Put at the very top of your written hurricane plan (or taped to your vessel's nav station during hurricane season) this important statement: *the first key to surviving a hurricane is to move to safe harbor as early as possible.* √√√



COMMUNICATIONS & WEATHER REPORTS

There are three main organizations with which Virgin Island boaters are in regular radio contact during a hurricane. They are WAH, VISAR, and the USCG.

WAH, known locally as *Virgin Islands Radio*, transmits from an antenna on top of Crown Mountain on St. Thomas. Although they are a private, for-profit, ship-to-shore telephone business, their extraordinary public service during emergencies is well documented.

They transmit on both VHF and SSB frequencies with plenty of power, and often serve as a vital communication link between vessels in distress and shore. (776-8282)

WAH transmits continuous weather information on VHF Weather Channel 3. They also transmit weather three times a day on HF SSB Channel #401 (4357.0) at 6 a.m., 2 p.m., and 10 p.m. (Additional stations such as WOM also transmit the weather.)

Note: be patient with WAH operators during weather emergencies. They are often short-staffed, extremely busy, and under a ton of stress. For decades, they've done an outstanding job of helping the marine community through numerous storms—and regularly perform many difficult tasks of great benefit to the marine community without any remuneration.

Another organization is VISAR, which stands for the *Virgin Island Search and Rescue* organization of the British Virgin Islands.

Although they are BVI-based and funded, they provide continuous radio support during major storms and are particularly helpful to the hundreds of boats holed up in Hurricane Hole on the eastern end of St. John. This organization is totally volunteer, and yet their level of professionalism is extraordinary. (1-809-494-4357)

The US Coast Guard (USCG) can be reached on VHF Channel 16. Their St. Thomas office can usually be reached at 776-3497 during business hours. The San Juan Search and Rescue office (SAR) can be reached at 1-787-729-6770.

More and more vessels are carrying

cellular phones these days. We have two local companies which provide such service, Vitel Cellular (777-8899) and Cellular One (777-7777).

Again: continuous marine weather reports via WAH can be heard on VHF Weather Channel 3.

The times and frequencies of the longer range SSB (single-sideband) weather forecasts from the States seem to change quite often. For accurate, up-to-date information, consult *Radio Navigational Signals*, Publication 117, put out by the US Defense Mapping Agency. Also *Reed's Almanac* has a good section of SSB weather forecasts.

Two other organizations of interest to the marine community, especially after the storm, are the Virgin Islands Marine

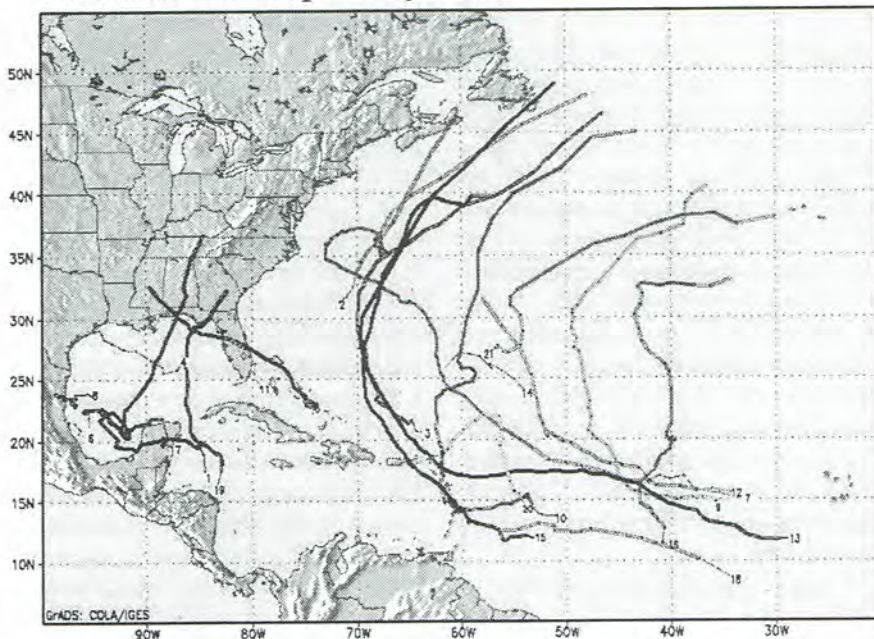
Industry (VIMI) association (774-8226) and the USCG Auxiliary (STT 774-6663, STX 773-9449).

Most Virgin Island residents ashore follow a hurricane's progress on our two most popular AM broadcast radio stations: WSTA is at 1340 and WVWI is at 1000 on the AM dial.

They will provide continuous, around-the-clock coverage of the storm—or at least until their antennas blow down.

It is also a good idea for crews to pick at least two specific 'communication telephone links' prior to the storm, one local and one Stateside. Thus, if separated, crew members can reestablish contact quickly. Why two? If our local telephone lines are down, it is often easier to reestablish contact via the States than locally. ✓✓✓

1995 Atlantic Tropical Systems



NO.	TYPE	NAME	DATE	NO.	TYPE	NAME	DATE
1	H	ALLISON	JUN 03-06	10	T	JERRY	AUG 22-28
2	T	BARRY	JULY 06-10	11	T	KAREN	AUG 26-SEP 3
3	T	CHANTAL	JULY 12-20	12	H	LUIS	AUG 27-SEP 11
4	T	DEAN	JULY 28-AUG02	13	H	MARILYN	SEP 12-22
5	H	ERIN	JULY 31-AUG08	14	H	NOEL	SEP 26- OCT 07
6	H	FELIX	AUG 08-22	15	H	OPAL	SEP 27-OCT 05
7	T	GABRIELLE	AUG 09- 12	16	T	PABLO	OCT 04-08
8	H	HUMBERTO	AUG 22-SEP 01	17	H	ROXANNE	OCT 07-21
9	H	IRIS	AUG 22-SEP 04	18	T	SEBASTIEN	OCT 20-25
				19	H	TANYA	OCT 27-NOV 02

WHAT IS SAFE HARBOR?

A safe harbor is land-locked. Since the wind will clock 360 degrees as the eye of a hurricane passes overhead, a safe harbor cannot be exposed to the open sea from any direction.

If the waves from open ocean can get into the harbor from any angle, your chances of survival go down drastically.

A good hurricane hole is called a 'hole' because it also offers some protection from the wind. Generally speaking, harbors surrounded by mountains are better (in most, but not all, ways) than harbors surrounded only by a low-lying sand spit.

The bottom of the harbor is important too: an ideal hurricane hole has 'good holding' for your anchors. This usually means sand or thick mud. A hard or slate bottom isn't good, nor is a rocky or coral-strewn one.

The depth of water is also important. Since you are going to want a maximum amount of scope (7 to 1) on your, hopefully, numerous anchor rodes, it should be relatively shallow. Four or five feet under your keel is ideal in a landlocked harbor.

Don't forget that as the eye passes overhead, your depth many TRIPLE.

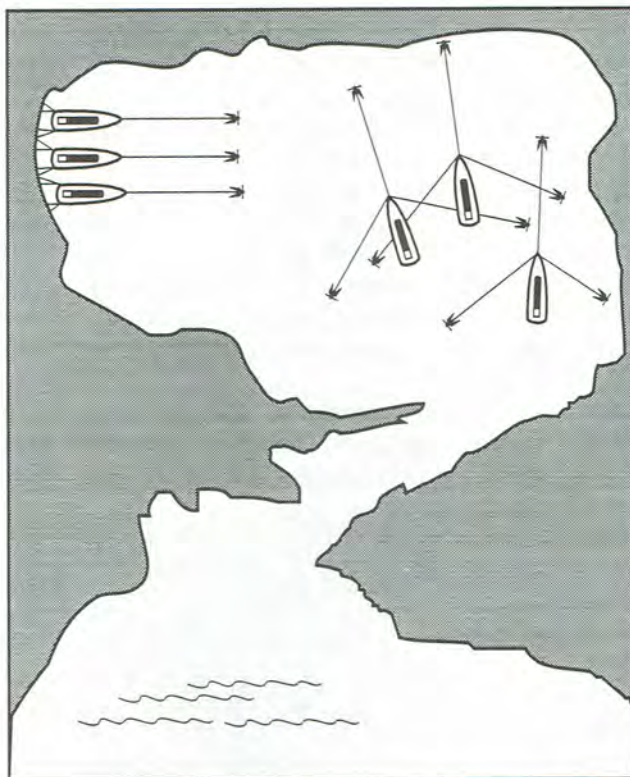
Let's assume that your vessel draws seven feet, and has a topside height of five feet. If you are anchored in ten feet of water—and the storm surge is 20 feet—that means you'll need to veer out about 245 feet of anchor line to achieve the proper 7 to 1 scope *even though there is only three feet currently under your keel.*

10' depth
+ 5' feet topsides
+ 20' feet storm surge

35' feet of distance from the
bottom to the anchor chock
X 7 for scope

245' anchor rode

We realize it is difficult to carry such long anchor rodes—but we *warned* you that surviving wasn't going to be easy, didn't we?



Another factor is that some safe harbors BECOME unsafe and exposed with such a high storm surge. Breakwaters, barrier reefs, and sandspits can become utterly ineffective during the passage of the eye because of the rapid increase in water depth.

Many boats which otherwise would have made it through the storm have been lost because of this 'what-the-hell-happened-to-the-sandspit?' phenomenon.

A good hurricane hole should also virtually eliminate the possibility that your vessel can get completely 'swept out to sea' by the storm. (This is especially important if you are going to ride out the storm aboard.)

Rocky shores are bad news. Ditto cement bulkheads. Both will instantly wreck your vessel if she is driven onto them. They also 'bounce' back the waves without absorbing or diminishing them. In addition, they make safely abandoning your sinking vessel in

mid-storm almost impossible.

Mangrove-lined shores are best. Mangroves provide something strong to secure to, and they are wonderfully soft and forgiving if your vessel ends up being driven upon them. Mud and sand are the next best choices.

Forget about most marinas or docks, especially those in the Long Bay or Red Hook areas.

Many local marinas require you (read the fine print of their contracts) to vacate their docks in the event of a storm. Very few marinas welcome unexpected 'storm' guests.

In any event, the viability of marina survival depends primarily on the storm surge. With a three foot storm surge, staying in a landlocked marina *might* be a reasonable idea—however, with a 12 foot storm surge it is most assuredly not.

It should be noted, however, that some well-prepared vessels have managed to survive recent storms in the Limnos, Saga Haven, Compass Point, Salt River, and Green Cay marinas.

If you *must* stay in a marina during a hurricane, tie your vessel up with extra long docklines in such a manner that it will not end up on top of the dock. Staying in your normal slip is often not a good idea because there simply isn't enough room to surge back and forth within it under severe storm conditions. Many vessels in marinas set out their storm anchors in addition to all their docklines. Vessels lying against a cement wall or bulkhead (without an extra strong pair of pilings to hold it off) seldom survive. Vessels able to tie midway between two large docks seem to do better.

Local knowledge plays an important part here. If you are new to the Virgin Islands or just cruising through—ask a couple of knowledgeable, local cruising sailors for their advice on the best local hurricane holes and/or marinas. You'll be surprised how open, honest, and helpful they will be. ✓✓✓

WHERE IS SAFE HARBOR?

Obviously, a lot of information contained in this booklet is highly subjective. Reasonable seafarers might differ on some of the finer points.

However, we feel it is in the best interests of the general marine community if we offer as many *specific* recommendations as possible.

Bear in mind that a 'perfect' anchorage for one hurricane might be a death trap during the following storm.

In addition, luck often plays a strange, mysterious role. For instance, Great Cruz Bay on St. John is totally exposed to the southwest, and yet one boat has sat there for almost 15 years through numerous storms without a single problem. It has never even been cosmetically damaged, while Hurricane Marilyn alone sank thirty of its nearby neighbors and heavily damaged almost all the rest.

UNSAFE HARBORS

The following harbors and bays are NOT considered safe in the event of a direct hit by a major storm.

On St. Thomas: Long Bay, Lindberg Bay, Brewers Bay, any anchorage off Water Island or Hassel Islands, Red Hook Harbor, Perseverance Bay, Cowpet Bay, Christmas Cove, Magens, Hull, Santa Maria, Stumpy, Botany, Fortuna, etc.

On St. John: Frank Bay, Turner Bay, Great Cruz, Chocolate Hole, Rendezvous Bay, Reef Bay, Fish Bay, Great Lameshur Bay, Salt Pond, Round Bay, Haulover, New Found Bay, Brown, Leinster, Francis, Maho, Cinnamon, Trunk, Hawksnest, Caneel Bay, etc.

On St. Croix: Christiansted, Fredriksted, Cramer Park, Cotton Garden Bay, Knight Bay, Coakley, Prune, Chenay, Punnet, Annaly, Cane Beach, Maroon Hole, Hans, Butler, Sprat Hole, Sandy Point, Long Point, Cane Garden Bay, Manchenil, Halfpenny, Robin, Rod, Turner Hole, Grapetree Bay, etc.

A sizable number of boats have stayed in Teague Bay during major storms, but their survival rate has not been good.

SAFER HARBORS

In a sense, no harbor is really 'safe' in a hurricane. However, the following harbors have been used extensively (and successfully) by a wide variety of craft during hurricanes.

On St. Thomas: Brenner Bay Lagoon. The Mandahl Salt Pond is a popular spot, but can only take 5 1/2 feet of depth at dead high tide.

On St. John: Hurricane Hole (National Park), Coral Harbor, Mary's Creek (National Park), and Cruz Bay.

On St. Croix: Krause Lagoon (aka Krause Lagune and Harvey's Channel), Salt River, and Green Cay Marina.

Note: Krause Lagoon will have large commercial traffic (tugs and barges) arriving relatively late. Hess Channel has large ships. The entrance to Salt River is shoaling: seek local knowledge if your vessel draws more than five feet. Green Cay Marina doesn't have much room.

Hint: if all the vessels lost in Hurricane Marilyn and/or Hugo had gone to Hurricane Hole on St. John, the majority of them would be afloat today.

OTHER OPTIONS

Another good option is Culebra. Despite its bad reputation from Hurricane Hugo, it is still one of the better hurricane holes in the Caribbean. It is relatively uncrowded, has excellent holding ground, and is populated only with those shipshape cruising vessels capable of making the open water passage from St. Thomas or Puerto Rico.

Despite almost 300 vessels being driven ashore during Hurricane Hugo, not a single act of looting or theft was reported during the first seven days (until the ferry from the big island started running).

The BVIs offer a number of harbors worth considering. Their official hurricane sanctuary is in Paraquita Bay on Tortola

OTHER IDEAS

The West Indian sailors of yesteryear used

to sink their vessels intentionally just before a storm. Their reasoning was that an intact vessel on the bottom is a lot more valuable than one scattered on the beach.

This method, however, probably makes a lot more sense for an engineless 'island sloop' than for a modern recreational craft.

However, small daysail and rowboat owners might consider such a low-tech, inexpensive solution.

Another option is hauling out at a local shipyard. But take into account that most shipyards are, as one might expect, rather close to sea level. Thus, many vessels have fallen off their supporting poppets because of the storm surge and coastal flooding—and 'sunk' while on the hard.

Peter Stoken of *Independent Boat Yard* in Brenner's Bay keeps his beloved *Independence* (a CYS 44 on which he's cruised the Pacific) in the water during hurricane season.

"During Hurricane Marilyn, the boats at our docks fared better than the boats in our yard," reported Stoken.

Some shipyards in the Caribbean will dig special 'hurricane keel' trenches in the dirt for an additional fee. The idea is that your boat won't be too badly damaged if she falls off the poppets during a storm.

This makes some sense wind-wise, but offers no special protection from flooding and storm surge.

St. Croix Marine in Christiansted has had a good track record by hauling all the boats at its docks by prior agreement. They require that your mast be taken out also.

STAYING AT YOUR MOORING

If you are forced to stay at your regular mooring in a less than perfect harbor, deploy all of your regular anchor gear in addition to your normal mooring tackle.

Once the harbor is clear of all neighboring vessels, spider-web your bow to as many vacant moorings as possible.

Note: ask for prior permission to use these surrounding moorings. If you damage or lose anyone's gear, you must repair and/or replace it *immediately* after the storm. ✓✓✓

DIFFERENT BOATS & SOLUTIONS

Many small boats can be hauled out and stored ashore as a storm approaches. However, just because your vessel is ashore doesn't make it safe. Make sure that it is stored on high ground where the storm surge and/or coastal flooding can't injure it.

If your vessel is on a trailer, chain the boat and trailer together—and then fasten *both of them* mechanically to the ground with metal stakes, sandscrews, or even buried anchors!

In addition, let some of the air out of the trailer's tires, and consider placing cinder blocks or open buckets of water in the boat to hold it down.

Avoid placing the boat where something large might fall on it—like a roof, porch or car. Reduce its windage, just as if it was anchored.

Consider taking off its outboard motor, and flipping the boat upside down. If left upright, make sure the drain plug is wide open so the vessel doesn't 'sink' from the torrential rains while on 'dry' land.

SPORTFISHING VESSELS

Sportfishing vessels present a special group of problems because of the excessive windage of their tuna towers, outriggers, etc.

During Hurricane Hugo, large sportfishing vessels fared rather poorly. One nicely maintained 56 foot sportfishing vessel constructed by a reputable builder was literally shredded by the storm. First it lost its tuna tower, then its flying bridge, front

windows, cabintop, cabin sides...

It is critically important for sportfishing vessels to pay as much (or more) attention to reducing windage as sailboats.

A sportfishing boat, because of its extra windage, needs far bigger anchors than a comparable cabin cruiser. Since many Virgin Islands sportfishing vessels live at marinas when they are not trolling the North Drop, their anchor gear tends to be minimal compared to an offshore cruising sailboat which spends its life at anchor.

Beware of large glass windows and wide sliding doors—for obvious reasons.

Many power vessels crank up their engines to relieve the strain on their anchors during hurricanes. This should only be done if your anchors are already dragging, otherwise it may actually contribute to yanking out your anchors. Whenever your engine is running, there is the danger of wrapping an anchor rode in your props.

Crank up if you must, but be aware that this adds another layer of complexity to an already difficult situation. *Cranking up is certainly not a cure-all or substitute for proper anchor gear.*

LARGE VESSELS

Large recreational vessels (power and sail craft over 70 feet on deck) also have a fairly bad track record in hurricanes. Statistically, larger vessels suffer more damage than smaller ones.

The reason for this, perhaps, is because

large vessels often have comparatively small anchors for their size, weight, and windage. In addition, it is difficult for them to obtain the same degree of protection and shelter as smaller craft.

MULTIHULLS

Multihulls have distinct advantages and disadvantages during a hurricane.

Advantages: shallow draft allows them to anchor in locations where most monohulls cannot reach. Their light weight doesn't require as heavy anchor gear. They don't sink.

Disadvantages: they cannot stand too much abuse without suffering severe structural damage.

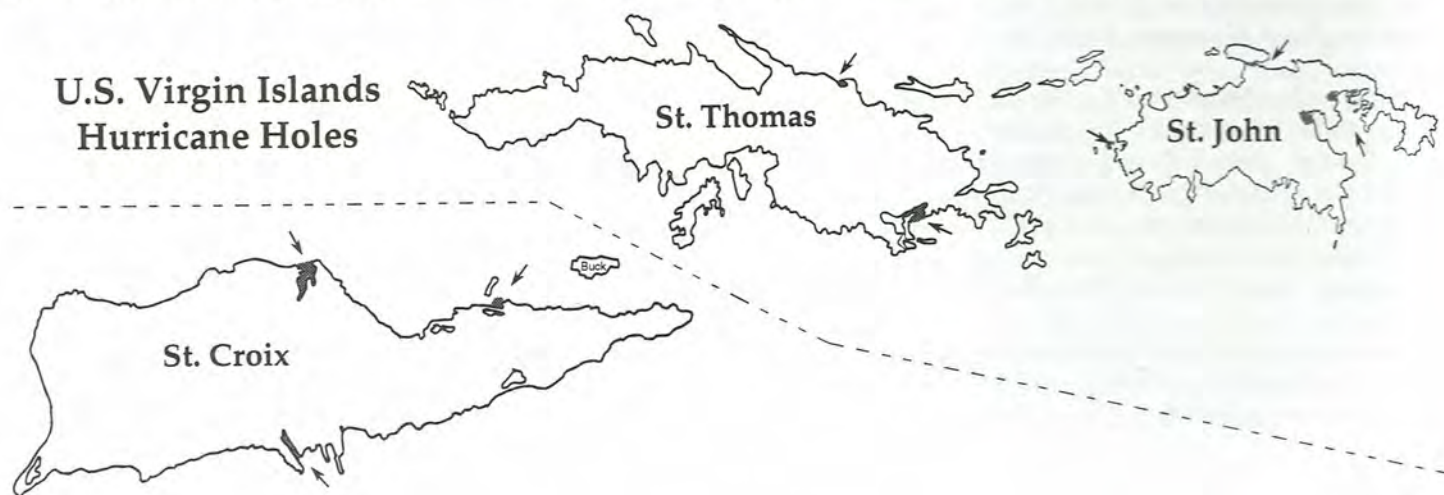
Their light displacement and curved akka shapes often allows them to momentarily 'fly' above the water—with disastrous results.

Also, they tend to 'sail' on their anchor. In addition, multihulls with rotating wing masts can present excessive windage under certain conditions.

Recommendations: consider dropping your rudders just before the storm. Take down your wingmast if possible.

Most multihull experts recommend slightly flooding your hulls in order to ensure that the vessel won't become airborne.

Bridles are especially important on multihulls to avoid their 'sailing' (yanking) their anchors out. ✓✓✓



ANCHORING: PICKING YOUR SPOT

The first rule of hurricane survival is to **move early**. The second rule is to **anchor well**.

What is the secret to anchoring well?

The first problem is deciding where to anchor, not how.

The best spot to anchor (all things being equal) is where you won't get hit or dragged into by another vessel. *Not getting hit is of the utmost importance.*

The vast majority of vessels lost during Hurricane Hugo in Culebra were hit by another vessel before they themselves hit the beach. Almost all the vessels that came through undamaged were *not* hit by another vessel.

It's that simple: avoid getting hit, and you've increased your chances of survival a hundred-fold.

One vessel can take out twenty or thirty others as it drags, and each of *those* vessels can take out an equal number of additional vessels...

...thus, a single vessel dragging anchor can take out an entire harbor—and be the direct cause of every other vessel's demise within it.

This is not an exaggeration. It has happened.

HOW TO AVOID GETTING HIT

Anchoring in an exposed location is not a good solution.

In 1995, during Hurricane Marilyn, a seventy-foot sailing vessel attempted to do just that. It's owner hooked onto a *seven thousand pound anchor* which was dug deeply into the bottom of Pillsbury Sound.

His idea was that the giant anchor wouldn't drag—and that there would be no other vessels around to drag into him.

He was correct on both counts, but lost his vessel anyway.

It was simply impossible to stay attached to the anchor in such an exposed location. The wind and seas just put too much stress on the anchor rode and/or its attachment point.

Something broke, and the vessel came loose well before the height of the storm. Its

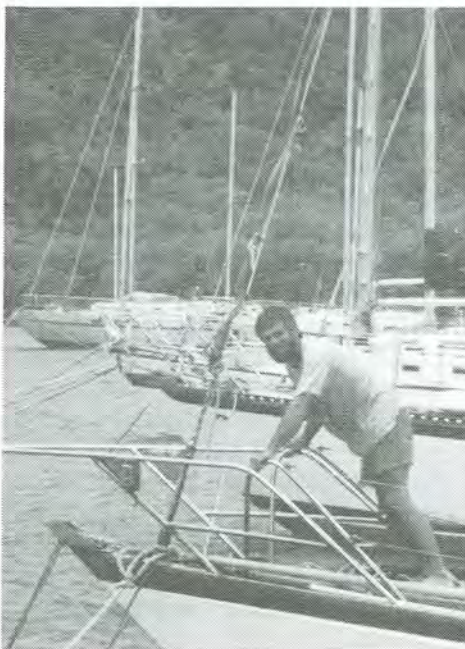
owner barely escaped with his life.

So anchoring in an unsafe or exposed harbor isn't the solution. All the swinging room in the world isn't going to help if breaking waves are hitting your vessel.

Instead, seek safe harbor early—and then carefully check out the vessels anchored around you. Pay particular attention to the vessels which are going to be directly to windward of you as the 'breeze' clocks around...

Do these craft appear to be commanded by knowledgeable, experienced seamen? Do they have solid anchor gear down? Are their anchor rodes massive and many?

Or do these vessels appear to be weekend warriors, dock-huggers, or (worse yet) the Too Heavily Insured?



Anchor accordingly—and pray some late-arriving idiot doesn't barge in at the last moment to ruin it for everyone.

One more thing: don't anchor directly down wind of anything loose ashore which can become windborne.

Example: a boater in St. Augustine, Florida, once thought he'd found the perfect hurricane hole. It was far, far up a little creek, totally land-locked, and it offered 360

degree protection from the wind.

Unfortunately, it was also dead downwind of a lumber yard. And his unlucky vessel was slowly demolished by the heavy planks raining down on it like silent artillery shells.

ANCHORING OUT

In many Virgin Island anchorages, you have the choice: you can anchor out in the bay or tie to the mangroves.

Both have advantages and disadvantages.

Anchoring out in the middle of the harbor allows your vessel to pivot into the wind. This means your vessel will have less windage exposed to the force of the storm, and thus less strain on your gear.

However, this requires a tremendous amount of room in the anchorage. Since your anchors will have to be fanned out in a giant 200 to 600 foot circle around your vessel, they will be easily snagged by any nearby dragging vessel. Your boat could be lost as a result.

Another negative: if your vessel sinks from under you, it will be a very difficult swim ashore.

TYING TO MANGROVES

Tying to mangroves offers a number of distinct advantages. With the roots of the mangroves to tie to, you can get by with fewer anchors. Your vessel will take up the minimal amount of room. It will be easier to get ashore safely if your vessel sinks. The closeness of the land often offers some protection from the wind.

Disadvantages: your vessel cannot pivot into the wind. You have almost no reaction time if your anchors drag or another vessel hits you. Vessels moored stern-to in this manner often have their rudders and/or skegs damaged if driven backwards by 'anchor rode stretch.'

Finally, mosquitos can be a major problem before and after the storm. Don't laugh! We've seen mosquitos in Hurricane Hole which appeared to be big enough to water-ski behind. √√√

ANCHOR GEAR

Basically, you are going to need a decent number of good anchors to survive a hurricane. The more, the merrier. The larger, the better. And the more anchor rode you can pay out, usually, the better.

What type of anchor is best? That's debatable. But most major quality name-brands are okay, *if* they are of sufficient size and strength, and properly deployed with generous scope.

Highly recommended are large Danforth™-style anchors. Bruce™ anchors of generous size have had good reports.

Cut-rate anchors are often worth exactly what you pay for them.

Many local sailors have been discouraged by the ultimate holding power of plow-type anchors—especially the off-brands.

How many anchors will you need? As many as you've got, plus all you can beg, borrow, and (temporarily, of course) steal. No vessel has ever been lost in a hurricane because it had too many (or too large) anchors.

Most well-found cruising vessels in the Virgin Islands have three or four anchors of sufficient size for normal conditions. Many experienced Caribbean cruisers also have a 'big gun' in the bilge, say a 150 pound folding yachtman or a large aluminum Fortress™ anchor.

Many 'experts' suggest that a storm anchor should be three times heavier than a normal one. This is easy to suggest, but rather difficult to abide by. What vessel which normally anchors with a 60 pound CQR has three 180 pound CQRs tucked away in its bilge?

Although most marine supply stores will sell out of medium-sized anchors quickly if a storm is approaching, they will often still have both large and small anchors for sale.

If a storm is on the way, buy 'em. And plenty of anchor rode, too.

This could be the best money you ever spent.

Even small anchors can help: during Hurricane Andrew a power boat anchored in Key Biscayne yanked out its 2,000 pound mooring, and then made it through the rest

of the storm on its two modestly sized Danforths™.

If you spend a lot of time in the tropics, you'll have plenty of opportunity to purchase a wide variety of used anchors very cheaply... from the sad owners of wrecked vessels who neglected to do so just before the last storm.

Many of the vessels which successfully rode out Hurricane Marilyn had between five and ten anchors out—a number of vessels had more.

Excessive?

Maybe.

But they made it.

DEPLOYING YOUR ANCHORS

In a deserted anchorage, this would be easy. But chances are you will be facing a hurricane in a relatively crowded anchorage, surrounded by people as nervous and uptight as yourself.

This makes it a little more complicated, and a lot more stressful.

If you are a cruising sailor, you probably already know how to anchor.

The only difference is that this time your vessel (and perhaps your life) will depend on how well you do the job.

ATTITUDE

What's attitude got to do with it? Plenty. Make sure that all your neighbors know that you are not going to do anything completely selfish which puts their vessel at risk.

You must cooperate with your neighbors to survive.

Be nice. Introduce yourself. Tell a joke...

Remember: it is NOT every man for himself. We are not animals, we are human beings. We care about the well-being of our fellow man.

Just before the storm, all the skippers in an anchorage should dive all the anchor rodes in their vicinity—and make sure that they are 'led' correctly.

In addition, remember that your boat might not make it. If it ends up on the beach,

you are going to need the caring help of a large number of people. So don't irritate the guy anchored next to you—because he just might have the gasoline 'crash' pump which you'll need to borrow to stay afloat.

PLACING YOUR ANCHOR GEAR

Use plenty of scope. Dig in your anchors by every means possible before the storm: use your engine, anchor windlass, and/or dinghy.

In essence, pre-tension them if possible.

Dive each anchor carefully, along its entire length. Attempt to visualize how it would lead if you lost one, two, or three of your other anchors.

If necessary, set it by hand. Use a shovel. Or blow compressed air under it to force it deep down into the muck or sand. Both flukes of Danforth™-style anchor should be completely buried.

Careful hurricane preparation requires you to spend a considerable amount of time in the water—especially in crowded anchorages.

It is best if no part of your anchor is sticking up above the surface of the mud or sand to get snagged, but this is often rather difficult to achieve with a yachtman or Norhill™ anchor.

Many experienced cruisers buoy their anchors with a loop of light line when they initially set them. This allows everyone else in the anchorage to know exactly where they are, and perhaps avoid fouling them.

Then, just before the storm hits, they untie the light lines they used to tether the buoys. Why? So these lines don't become entangled with other (dragging) anchors or in someone's prop.

If you are anchored out in a bay, and are relatively close to other vessels, make sure that all vessels are going to be able to 'swing' without hitting each other or fouling their respective anchor gear.

This means you have to understand how *all the vessels* in the area are going to swing. Usually, the quickest way to determine this is to dive all the anchors in the vicinity. √√√

ANCHOR LINES AND CHAINS

The consensus among experienced Caribbean cruisers is that the best possible anchor rode is a long piece of stretchy nylon—IF the harbor bottom is free of snags and you prevent the rode from chafing.

Nylon line is extremely strong for its weight and cost. A good quality three strand line can stretch over 20% without damaging its fibers. The breaking strength for 1/2 inch is 6500 pounds, for 5/8 inch is 11,000 pounds, and for 3/4 inch is 14,500 pounds.

Many experienced offshore sailors splice heavy-duty galvanized thimbles into both ends of their normal working anchor rodes. Thus, they can connect three 200 foot rodes together to form one 600 anchor line—very nice if you have to anchor in very deep water.

NEVER USE DACRON, EXCEPT...

Another anchor rode option: if your vessel is a sailboat, and you have more anchors than anchor rodes, you can use your non-stretchy Dacron sheets and halyards in a pinch.

The secret here is to use a snubber (or shock absorber) to make up for your Dacron's lack of stretch. The easiest way to accomplish this is to use an old discarded tire. Tie the Dacron line around the tire a few times, carefully protecting it from chafe. Then tie the tire onto your bits with nylon, also mindful of chafe. The tire acts as a giant shock absorber.

Dacron should normally never be used in place of nylon; however, if you've got nothing else....

CHAIN

Chain has one great advantage: it doesn't chafe. This means that it won't break in 200 knots of wind if another vessel rubs against it for an instant... like a nylon rode will.

Another plus: just before a vessel is driven ashore it often drags through a rocky area just off the beach. Nylon rodes immediately part when they ride over this abrasive stuff, while chain has one last

chance to catch and hold.

Disadvantages: chain is dangerous. It can chop off toes and fingers in the twinkle of a horrified eye.

Because it can't stretch, chain *always* requires a snubber in a blow. Without a snubber, a chain rode will often 'break the boat' by yanking out its anchor windlass, sawing down through its hull-to-deck joint, and/or pulling off the foredeck of the vessel.

Another factor: anchor chains are also much more likely to cut through another vessel's gear than nylon rodes. This will not only make you unpopular at the post-hurricane parties—but the nylon rode your chain cuts through just might take your vessel with it.

Many modern, moderate displacement boats don't carry chain because their finely shaped, narrow bows cannot comfortably handle the extra weight so far forward. Also, chain is becoming very unpopular with sailing ecologists because of the damage it can do to reefs.

Lastly, although new chain is as strong as it is advertised, the general public usually thinks it is far stronger than it actually is. Pound for pound and dollar for dollar, nylon is a far better deal.

Most 40 to 55 foot cruising vessels use 3/8 BBB chain. It has a safe working load of approximately 2,500 pounds, and an ultimate breaking strength of over 10,000 (under ideal test conditions). Any rust, corrosion, or wear drastically reduces its strength.

But there is no denying that a good heavy chain rode is a wonderful thing to (carefully) deploy as a major blow approaches.

ANCHOR SNUBBERS

These are a must. Two snubbers per anchor chain is a minimum, three is even better.

The first snubber should be about thirty feet long, and the second about 25 feet. Both snubbers should be *very* heavily chafe-protected—two or three plastic hoses-within-a-hose should do the trick. Nylon line, of course, is the material of choice for

snubbers. The 5/8 diameter size is adequate for most moderate displacement vessels under 40 feet, while 3/4 inch nylon (or greater) should be used for large vessels. Each snubber should terminate in a chain claw, chain hook, or hefty snap shackle. Do NOT put an eye splice on the inboard end—you'll want the option of veering or casting them off.

If you don't have a chain claw, chain hook or snap shackle, then do the best you can by lacing 3/8 nylon line through the chain. In any event, DO SOMETHING to make sure that the chain gets a shock absorber on it—or you will soon regret it. (We've seen truck inner tubes, automotive tires, yacht fenders, and various other strong, stretchy devices effectively used as emergency chain-snubbers.)

BASIC ANCHOR RODE

Chances are most of your anchors will have a long nylon rode with a short piece of chain attached. Needless to say, rusty and/or corroded chain is weak. Make sure your shackle is a size up from the chain, i.e., 3/8 chain requires a 7/16 shackle.

Also make sure that the shackle is 'moused' closed, i.e., lace the secured pin into the shackle bow so that the pin cannot unscrew or work loose. (Plastic electrical ties work well.)

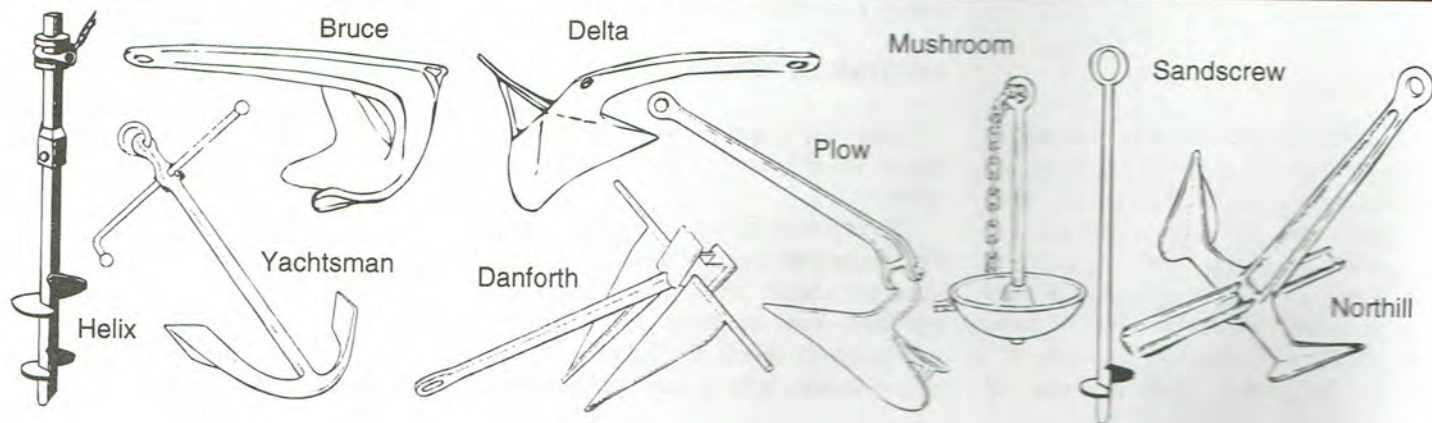
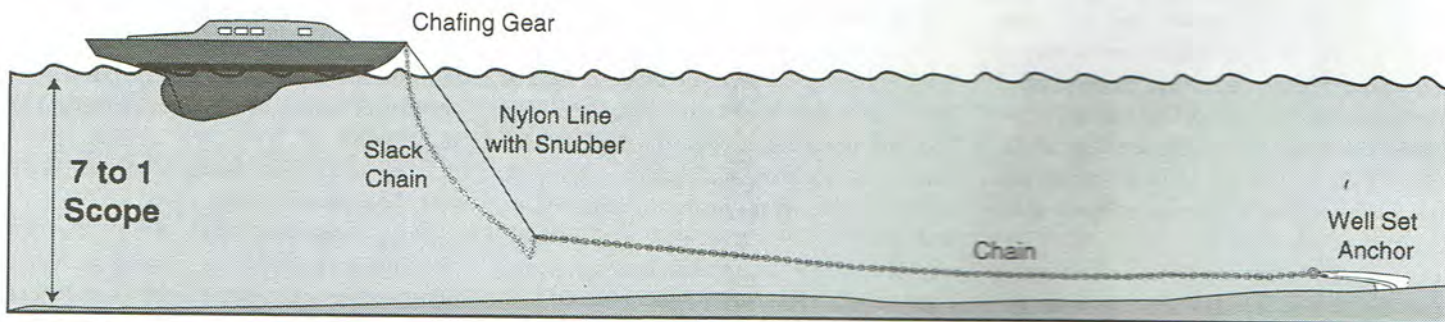
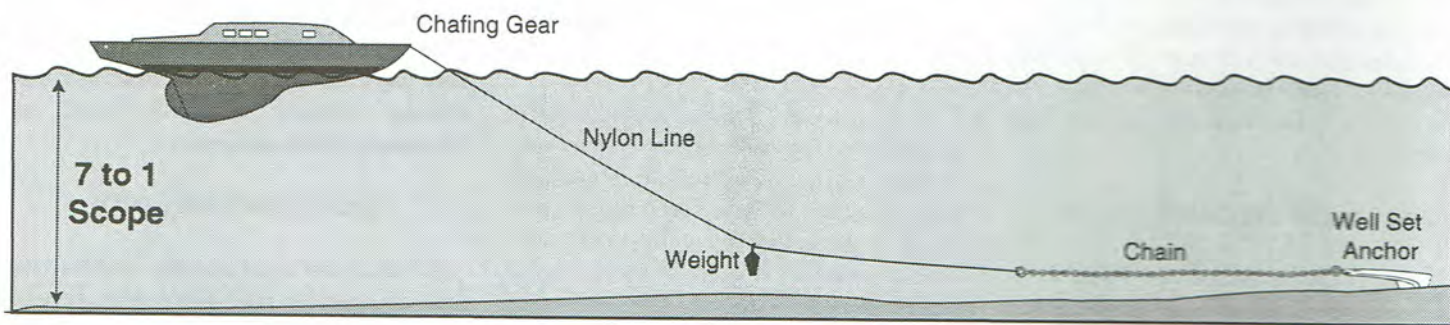
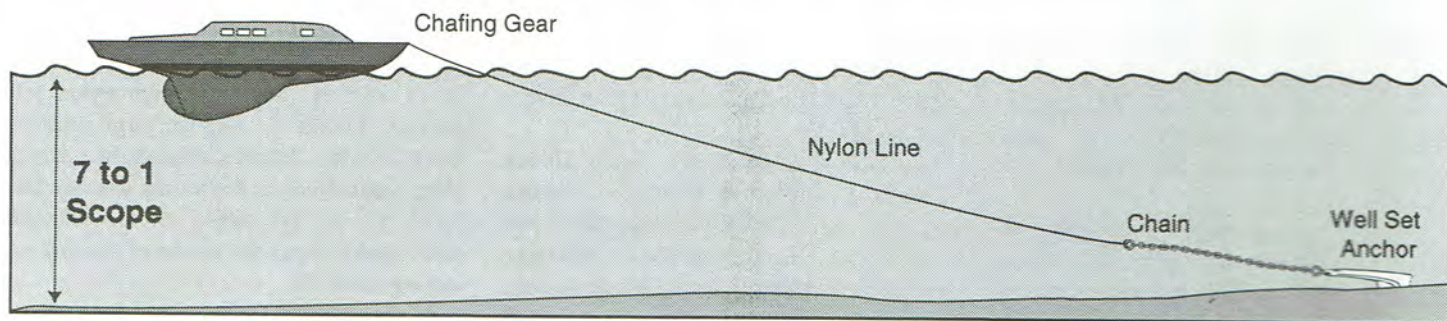
Don't over-tighten galvy shackles—they strip their threads easily.

Many knowledgeable sailors do not recommend stainless steel shackles or chains because they can appear to be in excellent shape while actually being severely corroded. ✓✓✓

Remember the three rules of hurricane survival:

- 1.) move early
- 2.) anchor well
- 3.) reduce windage

TRADITIONAL SINGLE ANCHOR PER RODE TECHNIQUES



MORE ANCHORING CONSIDERATIONS

A number of experienced sailors place more than one anchor on a rode. They (carefully, thoughtfully) place two or three anchors in series on an all chain rode, with the heaviest anchor at the end, the second heaviest about 30 feet inboard of that, and the lightest one thirty feet inboard of that.

This requires some extra scope because you should maintain a seven-to-one ratio from the closest anchor, not the one furthest away.

But the idea is that the smaller anchors take up as much load as they can, start to drag, and then take up on the next one... which might start to drag... but the final anchor will, hence, have very little load on it, and all of that load will be on a horizontal pull.

This is certainly the way to go if you have fifteen anchors and only five rodes.

Problem: be careful how you attach the anchors to each other. They should not be able to foul each other, nor should a small anchor breaking permit the vessel to become unattached to the larger anchors. Each anchor should be attached to the main chain independently.

Another method is to attach a small dinghy anchor on a short piece of light chain to the crown of a large yachtsmen-style kedge. This is reported to increase the kedge's holding power dramatically while not preventing it from deeply burying its lower fluke.

Here's another solution if you've got three good-sized anchors but only one chain rode and one nylon rode: cut up the chain into three pieces, and attach each anchor via chain to a central large shackle. Deploy in a giant Y-shape (120 degrees), and attach the single nylon rode between the large shackle or swivel and your vessel.

This system puts all your eggs in one basket, however. If your single nylon anchor line breaks, chafes, or gets cut—you are wrecked immediately.

ANCHOR WEIGHTS

The idea here is that light weight anchors

with nylon line can hold almost as well as heavier anchors with chain—because of the additional weight placed midway down on the anchor rode.

These extra weights offer two distinct advantages: they keep the pull more horizontal and reduce shock-loading.

In addition, these weights can help a vessel handle the sudden rise in water level from the storm surge without rode/line adjustment.

At the very least, some knowledgeable sailors believe the use of these weights turn light rope into heavy chain in terms of its holding power.

In extreme conditions, however, this is debatable. While adding weight to a nylon rode undoubtedly increases the holding power of some anchors in moderate wind conditions, during a hurricane your anchor rode is probably going to be bar-tight anyway.

That is—unless the weight you suspend on your anchor rode is extremely large.

Another negative: in crowded anchorages with boats lined up stern-to the mangroves, the use of anchor rode weights can complicate pre-storm attempts to eliminate vessel-to-vessel anchor line chafe.

Without weights, it is easy to determine if one taut anchor line will chafe against another. If weights are used, this is far more difficult.

Why? Because the weighted anchor lines won't make a consistently straight line between anchor and vessel. Instead, the weighted anchor line's vertical position will vary greatly as its weight raises and lowers with line pull.

If you have to anchor a vessel in deep water with relatively light gear, however, the concept is worth exploring.

Also, there is no question that a number of vessels in Florida attribute their survival during Andrew to the effectiveness of their anchor weights.

They used large, heavy weights: 1.) large buckets filled with steel and concrete 2.) gallon paint cans filled with lead 3.) old scuba tanks filled with molten lead (with a stainless steel eye bolt on top).

SANDSCREWS

No, this has nothing to do with sex on the beach.

Sandscrews are often used as permanent moorings in the Caribbean. They are relatively cheap, easy to stow in a bilge, and are fairly lightweight.

There are a number of local boats which carry a "quiver full of them" during hurricane season—or keep a pile nearby.

Of course, these usually require scuba gear to install, and the process takes a little time... but the results appear to be worth it.

This isn't to suggest using sandscrews in place of anchors—only in addition to them.

St. John sailor Paul Scarano went through both Hurricanes Luis and Marilyn with two large pristine boats under his command: his live-aboard Swan 42 *Maniac* and his giant multi-passenger catamaran *Stampede*.

He used a number of sandscrews as added insurance, and both vessels came through both storms without a single scratch.

PRESETTING YOUR ANCHORS

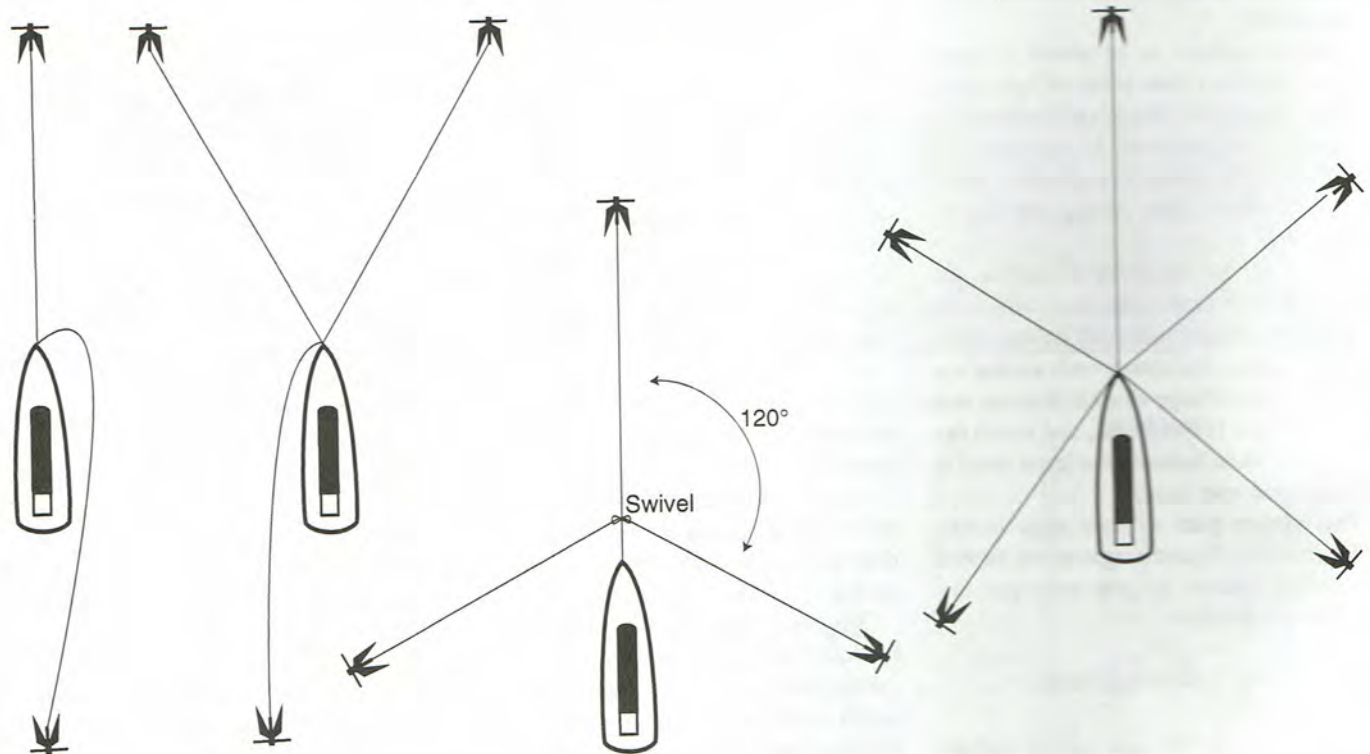
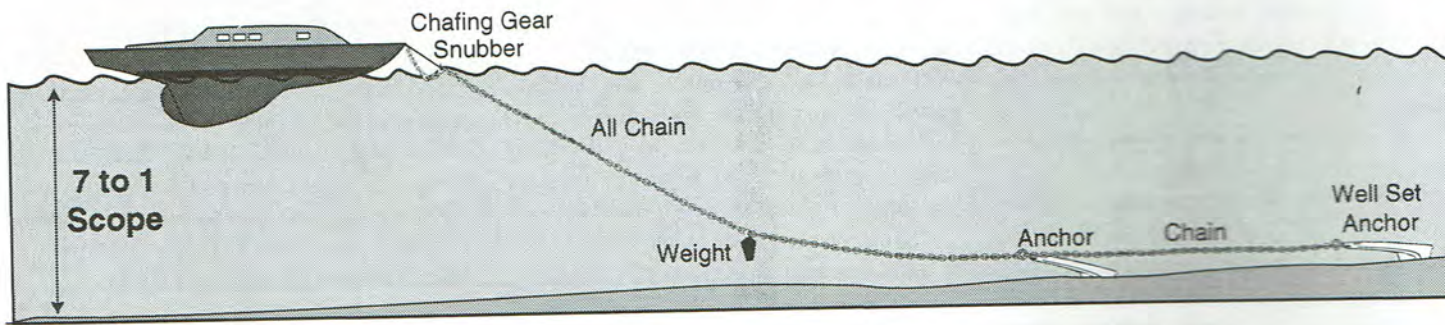
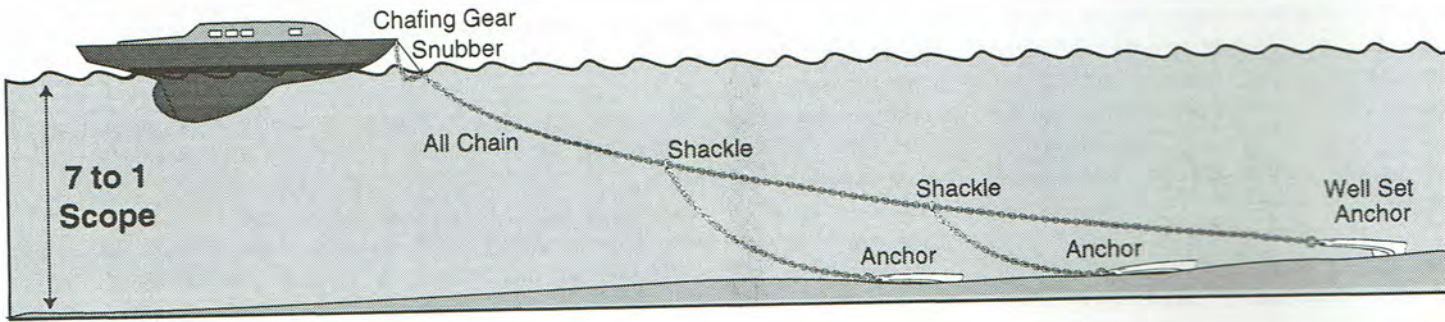
Although it is of questionable legality in certain harbors and bays, some VI boaters preset their hurricane anchors just as the hurricane season begins—and then leave them in place on the bottom.

Once a hurricane watch is announced, they simply steam into safe harbor and dive them up.

This can save time, but has many distinct disadvantages. 1.) Your anchors can be 'missing' just when you need them most. 2.) Someone can be anchored in your spot and unwilling to move. 3.) Your gear can be damaged in your absence. 4.) Being separated from your main storm gear can be disastrous if, say, your engine doesn't start. 5.) U. S. National Park officials or officers of the Department of Planning and Natural Resources (DPNR) may confiscate your gear if it was left in violation of the law. √√√

Your anchor gear is only as strong as its weakest link.

MULTIPLE ANCHORS PER RODE TECHNIQUES



ANCHORING STEP-BY-STEP

Let's take a close, step-by-step look at anchoring in the middle of a bay.

First off, determine exactly where you want to be. Check the depth at that spot, and determine how much scope you will need to pay out. Let's say you want to anchor in 10 feet of water with a topside height of 4 feet and a potential storm surge of 10 feet. Thus, you multiply 24 by 7, and get 168 feet.

You then power directly upwind 175 feet, come to a complete stop, and gently lower (never throw!) your anchor into the water until it just touches the bottom.

Begin reversing directly downwind (if possible) while paying out your anchor rode. About every fifty feet or so, put a gentle strain on the rode—just enough to straighten out the anchor chain and begin the process of digging the anchor in.

When approximately 168 feet has been paid out, snub off the anchorline while gradually stopping the backward motion of the vessel. Then cleat off the line.

To determine if the anchor is dragging, put your hand or bare foot on the anchor line forward of the vessel. If it is dragging, you can usually feel it immediately through the taut line. In addition to using your sense of touch, you can visually check for dragging by staring at the anchor line where it breaks the surface—if it is dragging it sometimes appears to 'jump' as your vessel slowly makes stern way.

If it feels and looks like it is holding, take some bearings ashore (between your vessel, a palm tree on the beach, and a house on the hill, for instance) to make sure that your vessel isn't slowly moving backwards. If it appears stationary, rev up your engine to half throttle while continuing to carefully observe your bearings.

Keep the engine running in reverse until you are completely satisfied your anchor is holding perfectly. (After you throttle down and take your vessel's engine out of reverse, your vessel will temporarily spring forward.)

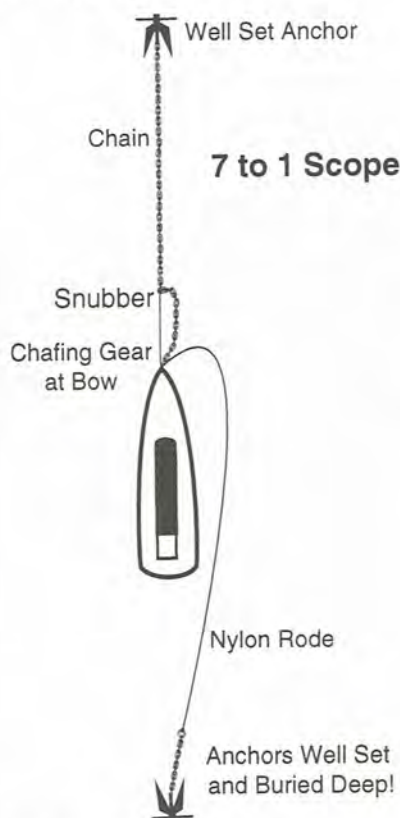
Once it settles back into place, your vessel should be within a few feet of where you desire it, with its anchor well dug in.

Recalculate your scope again, just to

make sure. If you don't have 7 to 1 scope out, don't depend on your anchors to hold in adverse conditions.

If your anchor kept dragging, start over. Slowly retrieve your anchor rode, and lift your anchor above the surface of the water. Carefully inspect your anchor to make sure that nothing is caught in its flukes or preventing it from hinging properly.

Then relower it 175 feet upwind from where you want to be, and back down as previously described.



It may not dig in on the first try, but it *certainly* should dig in on the second or third attempt. If it does not, perhaps the holding ground is poor, either too hard slate or too soft mud. (Generally speaking, holding is excellent in the Caribbean.)

ADDITIONAL POINTS

All anchors should be pre-dug in as much as possible. All anchors should be snorkeled, and visually inspected to make sure that they

are digging in, and that they are not fouled, hitting something, etc. With tension on all interwoven anchor lines from various vessels, all skippers should snorkel all anchor lines to make sure they will not chafe each other during the storm (if everything stays put, anyway).

An almost endless number of anchors can be added to a very small space without problems *if everyone cooperates*.

Chain rodes complicate this process, but everyone just has to do the best they can to estimate whether any crossing rodes should go above or below the chain.)

Note: if a group of vessels are stern-to the mangroves, the wind will be the same for everyone. Thus, a port-side anchor rode on one boat normally won't foul a starboard-side anchor rode on another boat—because when one is taut the other will be slack.

Before Hurricane Marilyn in Hurricane Hole, many boats were so 'spider-webbed' to their anchors that it was almost impossible to approach them with a dinghy.

Remember: use only nylon line. Don't use old jib sheets or halyards because they are likely made of Dacron, a low-stretch material ill-suited for anchoring or tying up with. (Unless you must, and then you must use a shock absorber of some type.)

Back up all attachment points so that if you lose your bits or a few cleats—your anchors and shore lines will still be attached.

PROVISIONING FOR THE STORM

This is actually provisioning for two separate things—the hurricane and its aftermath.

Your vessel should have full fuel and water tanks, and be provisioned with enough canned food and dry stores to last a couple of weeks without any electricity or refrigeration.

Make sure you have plenty of stove fuel: if your vessel is one of the few which survive, you might be regularly cooking for a crowd.

After a disaster, you can't have too many paper towels, etc. A well-stocked first aid kit is worth its weight in gold. √√√

CHAFING GEAR

If you've got a good anchor attached to your vessel by a stout nylon anchor rode, then your next task is protecting that nylon line from chafe.

Chafe is one of the biggest problems of hurricane survival.

Nylon line is unbelievably strong. Even a 1/2 inch nylon line has a breaking strength of well over 6,000 pounds—that's a lot of strength. However, if there is a fairly heavy strain of 5,000 pounds on a line, it can completely chafe through within a few minutes if it is riding over a sharp edge.

Even a flat four inch teak rail cap will chafe through a nylon rode quickly if the line is surging on it with a heavy strain.

The only solution is to make sure that your nylon rode *never* chafes against anything but the soft chafing protection which you place around it.

The easiest, fastest, and cheapest chafe protection is a three foot long piece of rubber, plastic, and/or vinyl hose slipped over the line.

To keep it in place, tie and/or duct tape the hose to the rope. Leave most of its unused length inboard, because chafing gear always gets pulled *towards* the anchor, not away from it. (If your vessel has a bobstay and bowsprit, make sure that your chafing gear is extra long.)

Some veteran cruisers use two different size hoses for the ultimate in chafe protection. The long, skinny hose they attach to the anchor line, while the fatter one they attach to the vessel. This allows double protection—hose chafing only on hose.

Another good trick is to coat your anchor lines with white lithium grease just before the storm hits. This greatly lessens chafe, and helps make sure your nylon rodes won't literally melt from excessive friction.

Be neat. Don't allow your foredeck to become a skating rink if you use grease.

Use only relatively new anchor line. Our

sun is very strong here in the tropics, and after a couple of years exposure to our ultraviolet rays, the breaking strength of nylon begins to decline.

Don't ever put an eye splice at the end of an anchor rode; just finish it off with an whipping, an end splice, or a thimble.

Cleat off your anchor rode in such a manner that you can release it (and slightly 'start' it) under high load. This will allow you to continuously change the point of chafe as the storm wears on.

Most sailors use their dinghy to set additional hooks.

If you are using an inflatable dinghy with an outboard, putting the anchor in its bow and *backing away* from your vessel is often the easiest method. This eliminates being pulled to one side or the other because the anchor line is slightly off center over the dinghy transom.

If you are using a rowboat, tie the anchor with a light line just underwater over the transom of the dinghy, and then cut it loose when you are over the desired spot.

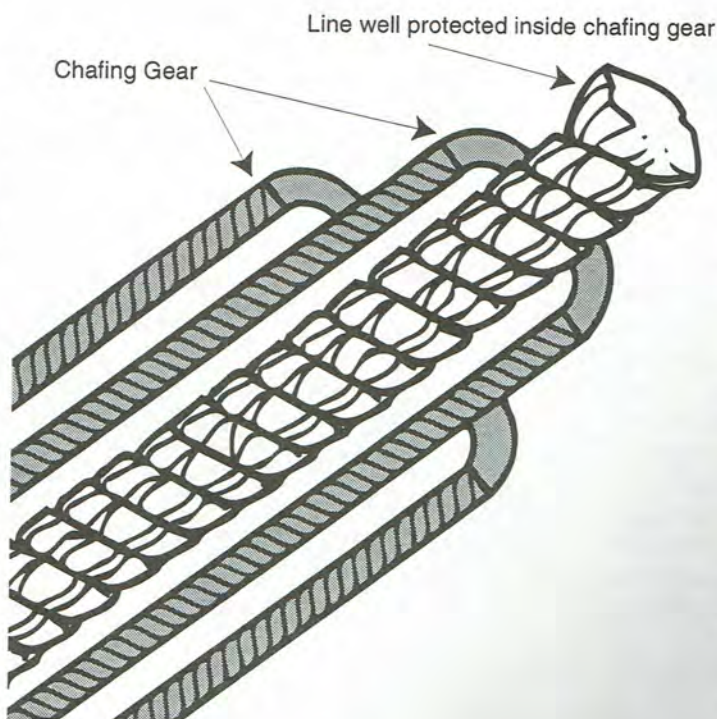
Rowing chain out can be a difficult task, but it *can* be done. Put the anchor between your legs in the dinghy, and then pile all the chain but the bitter end (still attached to yacht) in the transom. As you row, allow the chain to pay out in a controlled manner by using your foot as a break. This is, *ahem*, hell on the dinghy varnish, but possible with a little practice.

It is usually impossible to row out chain by feeding it out from the bow of the yacht. The weight of the chain and its drag will prevent the rower from making any significant headway.

Basically, the more the vessel is encircled within its anchors, the better. Three very hefty anchors are a bare minimum.

Put your best and heaviest anchors out in the direction which you expect the most wind for the longest period. Make sure that none of your rodes can foul any of your other anchors.

Attach all your rodes to the bow. Be wary of any anchoring scheme which requires you to attach anchors to various other points on your vessel. A number of fatalities during Hurricane Marilyn resulted from vessels being momentarily held broadside to the wind by their stern anchor after their bow anchors dragged or were cut. ✓✓✓



You are now all set if your anchor doesn't drag, your anchor line doesn't part, or your cleat doesn't pull out.

To back up your main cleat and/or bits, run an additional line aft to your mainmast so that if your forward attachment point fails, you are still attached to your anchor(s).

Power vessels can back up their forward bits by running a long line completely around their cabin house, or running two lines aft to their stern cleats.

Of course, you'll want more than one anchor out.

ANCHORING IN THE MANGROVES

First, pick your spot. Next, decide whether to go bow or stern-to the mangroves.

Most folks go stern-to the mangroves. Reasons: your bow is best able to break any incoming seas, and it is easy to secure your wide-apart stern cleats to the mangroves. Disadvantages: if you drag even slightly, your rudder and/or prop will hit the bottom.

Let's assume you are going stern-to.

Drop your anchor 200 to 250 feet away from the shore, and back into your spot. Be careful not to actually hit the mangroves or the bottom; just get close enough to hop into your dinghy to carry a light line ashore.

Once you are loosely held in place by a bow anchor and a line ashore—relax. There's no rush. Haste makes waste in this situation.

First attach four nylon lines from your transom to the mangroves. Two of them can go almost straight aft with only a little widening, and the other two can go out from your transom at a considerable angle.

The idea here is that the two aft lines will hold you from surging forward, while the two lines with more angle will hold your vessel from being blown sideways with the gusts.

These lines can be a mere twenty-five feet long, or considerably longer if needed.

They should be adjusted so they take up a strain in unison, if possible.

Please be kind to the mangroves. They are extremely important to our marine environment. In essence, they are the fish nurseries of our nearby reefs. Make sure you do not damage them in any way.

Wrap pieces of rugs, old towels or bits of canvas around the areas where you attach your lines. Tie your lines with a good number of raps around the tree limb to maximize surface area and minimize damage.

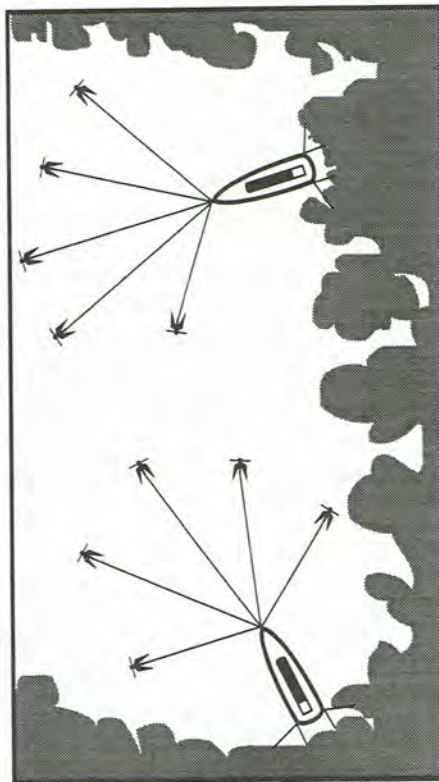
Only tie to large 'trunk' mangroves, and make sure your nylon lines have a clear lead to your vessel.

If maneuvering your dinghy near mangroves while attaching your stern lines, take care you don't damage the delicate polyps through which mangroves breathe.

Caution: mangroves are an incredibly important marine environment resource. Be especially careful in Mary's Creek and ashore in Hurricane Hole where strict National Park rules apply.

Note: while tying to mangroves is not specifically prohibited by law (Act 5664, Bill 18-0403), damaging and/or 'disturbing' the mangroves clearly is.

The Indigenous and Endangered Species Act of 1990 says, "No person may prune, cut, remove, or otherwise disturb any growth of mangroves, whether on private land or not, unless a permit..."



Of course, vessels down through the centuries have traditionally tied to mangroves during hurricane season, and no vessel has ever been prohibited from so doing if a storm is imminent.

Once all four of your stern lines are correctly attached ashore, it is time to think about your anchors.

Here is a tried-and-true method if you have three good sized anchors and two

smaller lunch hooks.

Place your three main anchors slightly fanned out directly ahead of you. The idea here is to give them some 'spread' (about 20 feet apart from each other) while placing them so that each one has the maximum effect of keeping you off the shore.

Put your best, heaviest anchor with your stoutest rode in the middle. Deploy maximum scope. If your anchor line doesn't quite reach the boat when you lead it back, that's perfect! Tie a temporary bowline in the rode, and clap on another line led through your roller chock to your anchor windlass (or aft to your genoa winches). The act of setting your anchor and keeping a strain on it for awhile will usually give you enough line to attach it directly to your bits.

In any event, arrange to have maximum scope out. Having hundreds of feet of useless line on deck doesn't help.

Your two smaller anchors should be led off your bow at a much greater angle, say 60 to 70 degrees. These aren't intended to hold you off the shore, but to prevent your bow from getting 'blown off' too much when the wind is on your beam.

These two wider-angle anchors have to be tensioned at the same time (against each other).

If there are vessels on each side of you, you should be about twenty feet apart. If you get any closer, you might hit each other and/or your rigs might come in contact. Finally, your masts should not be in line with your neighbor's.

In any event, either deploy or have your fenders ready to be deployed at a moment's notice.

If everyone is willing, the vessels can tie to each other very loosely from bow to bow. Make sure each vessel has the ability to cast off and/or ease these lines as needed.

This bow-to-bow tying is certainly not mandatory, but it allows a stationary vessel to help hold its dragging neighbor if they are being blown down to leeward onto another vessel. However, if the dragging vessel is pulling so hard on the stationary vessel that it is endangering it, the line can be cast off by either party. ✓✓✓

REDUCING WINDAGE

The first rule of hurricane survival is to **move early**. The second rule is to **anchor well**. The third rule is to **reduce windage**.

Minimizing your vessel's windage is a top priority. Don't just remove your yacht ensign and lower your Bimini top—strip everything possible off the deck.

The very first thing a sailboat should take off is its roller furling jib. It will not survive anyway—all roller furling headsails begin shredding at around 90 knots.

ALWAYS TAKE OFF ROLLER FURLING HEADSAILS. This is an *absolute rule* of hurricane survival. If you do not, additional boats and lives may be lost because of your gross negligence.

To repeat: millions of dollars have been wasted, hundreds of boats have been lost, and numerous people have died as a direct result of leaving up roller furling headsails during hurricanes.

But removing your roller furling headsails is just the start—just the beginning of your quest to reduce your vessel's windage.

Take off: all sails, biminis and frames, dodgers and frames, external halyards, removable ventilators, side curtains, etc.

Some sailors even remove their booms, self-steering gears, GPS and TV antennas, courtesy flag halyard, etc.

One knowledgeable local sailor even removes his stantions and lifelines!

Before the storm hits, ask yourself repeatedly, "Is there anything else I can take off to reduce windage?"

SECURING YOUR VESSEL'S GEAR

Double and triple lash everything on deck. Make sure that all your hatches are firmly battened down. (An amazing number of hinged and locked forehatches were literally sucked off by Hurricanes Marilyn and Hugo.)

Pay particular attention to your cockpit lockers—could your vessel be held down on its side by the wind for four or five minutes without taking a massive amount of water?

If the answer is no, fix the problem before the storm arrives.

Many experienced cruisers remove their liferaft from its normal position and stow it either on the cockpit sole or belowdecks. This prevents the raft from 'self-deploying' without need because of the high winds.

Obviously, a life raft would be very difficult to successfully deploy or board in extreme conditions such as a hurricane.

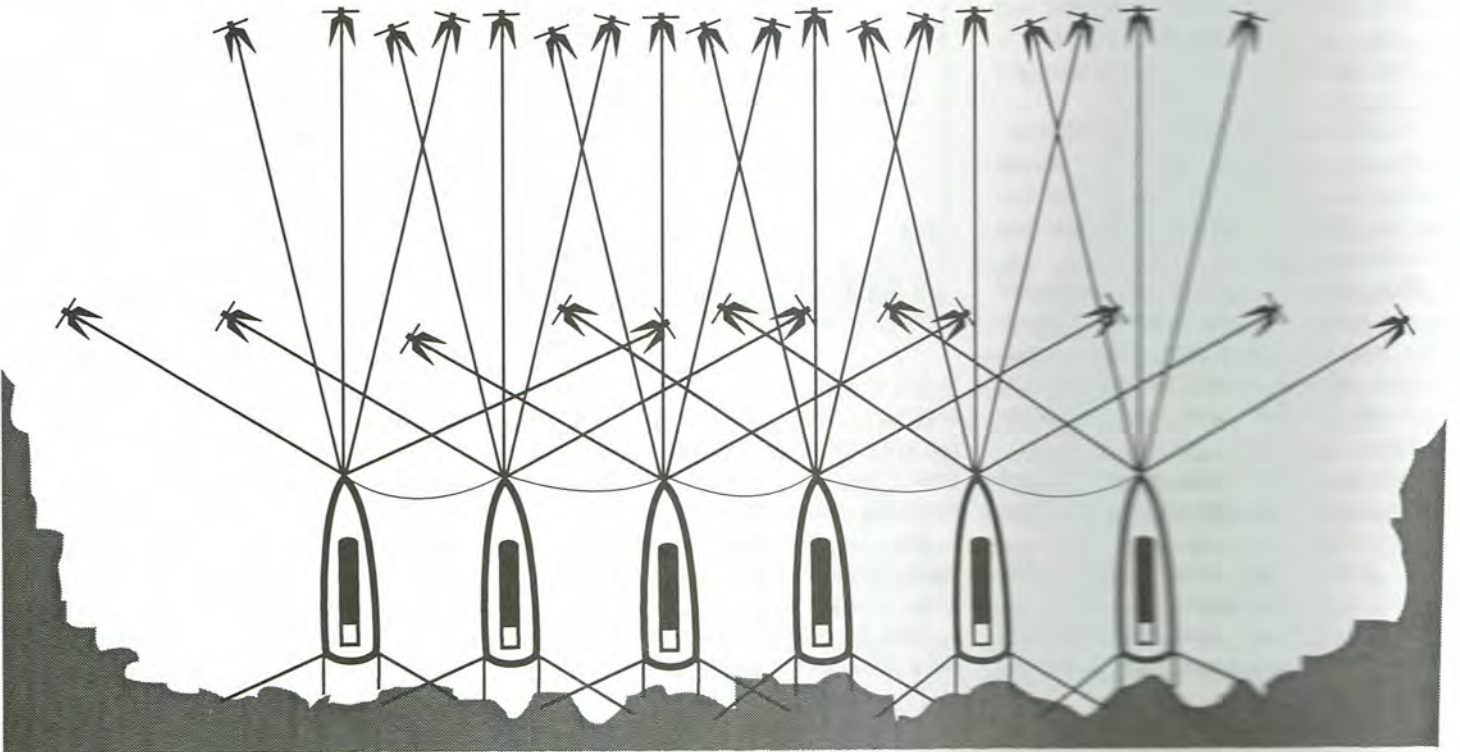
Consider removing (and sinking) your boom and spinnaker pole. If you leave your boom in place, double lash it to each side of your boat in addition to securing it with your mainsheet. Make double-sure your spinnaker pole doesn't become a deadly 20 foot long projectile.

Tape all your porthole glass (from the inside), and consider putting temporary plywood covers over any large windows.

If your vessel has propane gas tanks for cooking fuel, consider shutting them off as the storm begins. (The last thing you need to worry about during a hurricane is your vessel exploding from a ruptured gas line.)

If your vessel has a wheel lock, use it. If it has a tiller, secure it with multi-lashings.

Now is the time to deal with your dinghy. It's okay to stow its (gasless) outboard and oars aboard the big boat, but **DO NOT** lash the dinghy on deck. It is far too much windage, and too dangerous once airborne. Consider sinking the dinghy, or anchoring it separately. (Note: very few dinghies made it through Hurricane Hugo in Culebra.) ✓✓✓



AS THE WIND RISES

Run your engine, so that it will be warm and easy to start during the storm. Your batteries should be fully charged, bilge pumps tested, fuel filters inspected, spreader lights checked, etc.

Most anchorages agree before the storm to monitor a specific VHF channel, so that vessels within that specific bay can contact each other at will. Also, if any vessel begins dragging, it should alert the other vessels by beeping its horn and flashing its spreader lights if possible.

The reason for this is simple—by knowing that another vessel in the harbor is dragging, major damage can often be avoided. Anchor lines can be eased or released, fenders deployed, emergency space created, etc.

Although it is clearly a dangerous practice, sailors have been known to swim between vessels to offer their assistance in emergencies. We do not recommend this practice.

By this point in your storm preparations, you should have a very good idea of how the winds are going to veer—in other words, whether you are going to experience a direct hit, or a south or north pass.

Make sure that you have a sharp knife with a locking blade on your person, and one in a sheath in the cockpit. Place your waterproof flashlights in logical places.

Perhaps now is a good time to fill up that coffee thermos, and grab a quick, nutritious snack.

Also, shut off any unnecessary open seacocks: head sink, galley sink, refrigeration, bait wells, etc.

Note: do *not* shut off your cockpit scupper seacocks!

Disconnect any unneeded electrical circuits by flipping their circuit breakers. (You don't need the watermaker on now, do you?)

Once the storm is truly upon you, not much can be done. This is your final chance

to easily adjust your anchor lines, deal with your dinghy, etc.

One more point: a PFD (life jacket) can't save your life if you don't wear it. Note: during a hurricane, you'd never be able to don it once outside. Reminder: make sure you can easily exit your vessel through your main companionway and your forward hatch while wearing your lifejacket.

And don't forget to wear shoes!

A WORD ABOUT SAFETY

If you are staying aboard, your primary goal should be to avoid injury. NEVER allow your body to get between two vessels. DON'T attempt to fend off. BE CAREFUL of whirling winch handles, flying debris, falling trees, crashing masts, etc. PAY ATTENTION to where your fingers and toes are.

If you use a knife on deck, make sure you don't cut yourself. ✓✓✓



DURING THE STORM

There are only a limited number of things you can accomplish during a hurricane.

You can monitor your chafing gear, and ease lines which are carrying too much of the load.

A crowbar or a very large screwdriver can be useful while easing your rodes under tension. Be careful the rode doesn't suddenly 'jump' and get away from you..!

Be extremely careful with chain. It can be very difficult to release a small amount if it is under heavy load.

If a nylon anchor rode has lost its chafing gear, and is beginning to show signs of severe chafe, glob on some thick axle-style grease. You'll be amazed how much this will help.

If a chock gets yanked off your toe rail, it is sometimes possible to crowbar a piece of wood or thick plastic under it to lessen the resulting chafe.

If an anchor line is just about to break from chafe, you can tie a rolling hitch to the fraying anchor line (with a spare dockline) to carry the strain. (Okay, it's a long shot—but why not attempt it?)

If you begin to drag, you can crank your engine to relieve some of the load on your anchors. (This is *far, far* harder than you think!)

In addition, an engine occasionally allows you to 'dodge' a dragging vessel so you are not struck by it.

If your vessel is holed, you can run all your pumps in an effort to save her. As a last resort, use the engine raw water intake itself as a pump. (Make sure you shut off the seacock first, and put a bilge strainer on the raw water pump hose.)

If you are ripped free from your anchors, an engine might allow you to steer to a 'soft' landing from which your vessel can be easily dragged—rather than dashed to destruction on the rocks.

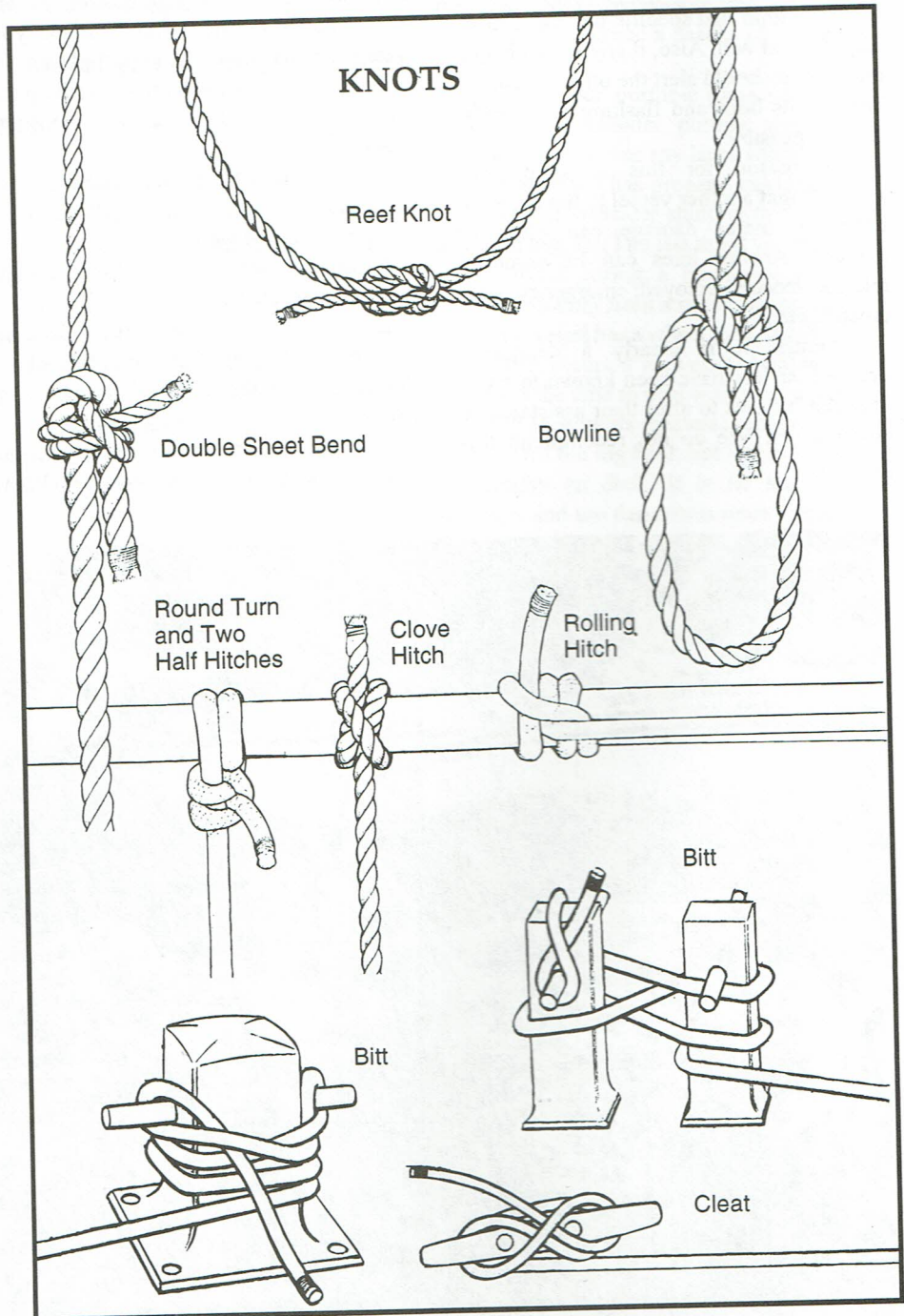
If a dragging vessel snags one of your anchors, the situation can sometimes be saved by casting that anchor off.

If you go on deck, have someone belowdecks (if there is someone) keep an eye on you at all times. Use a safety harness

while working outside, just as a single-handed sailor would offshore. A dive mask will come in handy—without one it is almost impossible to see anything to windward through the driving rain. Some sailors report that breathing through a snorkel is preferable

to having your mouth ripped open by the wind.

Make sure that your forehatch can be opened easily and quickly in case your main companionway hatch gets smashed closed by another vessel. ✓✓✓



AFTER THE STORM

This is a very dangerous time. Many of the most severe injuries and accidents take place after the storm, rather than during it. Be careful.

Avoid swimming with open cuts and/or swallowing sea water because most of the septic tanks ashore will have overflowed from the torrential rains.

Ashore, watch out for downed power lines. Major risks after a storm are electrocution, falling while working on roofs, severe cuts, stepping on nails, etc.

IF YOU ARE DRIVEN ASHORE

Take some comfort in the fact that things usually appear far bleaker than they really are. Boats can often be snatched off the beach cheaply and easily; fiberglass hulls are almost always repairable.

Do everything possible to save as much of your gear as possible—regardless of whether you are insured or not.

If your engine and/or generator was submerged, rinse it in fresh water and bathe it in oil immediately upon raising it. (Often, hiring a mechanic to assist you in this process saves money in the long run.)

To document your damage to your insurance company, the courts, or FEMA, photograph or video tape your vessel ASAP after the storm and during its salvage.

To clearly show people that your vessel isn't abandoned, place an anchor out to seaward attached to your bow (if there isn't one there already), tie a line to a tree, lock the boat when you leave it, and put a written notice on it which says:

THIS IS NOT AN ABANDONED BOAT. WE WILL BE RIGHT BACK. PLEASE DO NOT TOUCH OR TAKE ANYTHING. THANKS!

SALVAGE & OTHER LEGAL STUFF

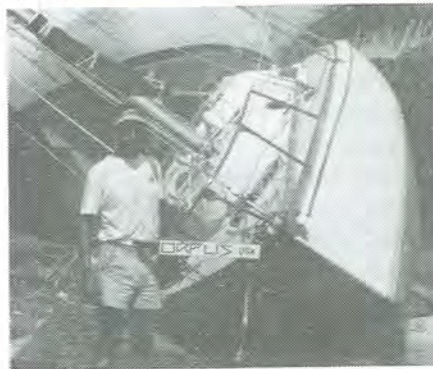
No person has the right to steal your possessions or claim anything you own as 'salvage' just because your vessel is wrecked or driven ashore in a hurricane.

A boat is, in many legal ways, just like a car. Let's say you parked your car on the hill, its emergency brake failed, and it unexpectedly rolled to the bottom of that hill. If someone found your car pulled over to the side of the road in the valley, they wouldn't own it, would they?

Of course not. The same principle applies to boats.

If your vessel is found *floating at sea unoccupied* or *breaking up on a beach unattended* and someone tows it into port—the towing vessel can then demand reasonable payment (or salvage) for its efforts.

The court might award the towing vessel a few hundred dollars if it went to almost no trouble to tow in a modest boat, or a few *hundred thousand dollars*, depending on the vessel's value—and how much time, effort, and risk the 'salvor' went through to save it.



LOOTING

Hurricanes bring out the best in most people, and the worst in a few.

While looting has not been a major problem in the Virgin Islands, wrecked boats do occasionally get plundered—by sailors and landlubbers alike.

The only solution is to guard your boat, lock your boat, and mark it as not abandoned.

Bear in mind that if your vessel is wrecked, you will be very distraught. This means you might be more combative and aggressive than you normally are. Don't allow this to get you into more trouble than you can handle.√√√

Rumors

After every major hurricane, certain rumors begin immediately circulating regardless of truth. Why these same rumors always crop up is an interesting question, but outside the scope of this booklet.

Rumor #1: the morgue is filled with the bodies of boaters. ("I talked to a guy who saw 'em!")

Rumor #2: some person or group is stealing all the lost anchors.

Rumor #3: a highly contagious disease has broken out.

Rumor #4: the government has ordered all wrecked boats to be removed immediately, or they will be destroyed tomorrow at noon.

Rumor #5: a giant two-bladed military helicopter is flying in, and will soon lift off all the vessels ashore for free.

Rumor #6: the local government is lying to us about a) almost everything, b) everything, c) both.

Rumor #7: hundreds of boats and people are still missing, presumed swept out to sea.

Rumor #8: one gust of wind was recorded at well over 200 knots before the anemometer which recorded it was blown down.

Rumor #9: the crane operators are in cahoots with each other.

Rumor #10: everyone else has gone totally bonkers since the storm but you and me, and I'm not so sure about you!

Rumor #11: a new powerful storm will hit us within a few days...

While there *might* be a grain of truth in some of these rumors, they always circulate regardless.√√√

REFLOATING YOUR VESSEL

THE EASY WAY

The majority of vessels driven ashore in a storm are soon refloated.

The best bet—if you can afford it or you have insurance—is to let a professional like Immel's Towing (774-3541) of St. Thomas do the job.

Jerry Immel and other professional salvors often work on a 'no cure, no pay basis'. This means that if they can't refloat your vessel, you don't have to pay them.

Of course, be careful before allowing anyone to attempt to tow your vessel—make sure you understand exactly what you are getting into. Talk about money *now*, not later.

Professional salvors don't work for free, of course, nor should we expect them to. Barges, tugboats, and cranes cost a small fortune, and charge accordingly.

This is understandable.

Of course, a few companies get overly greedy after a hurricane—as one might expect. But the good news is that a far greater number of people get very charitable under the very same stressful conditions.

After both Hurricanes Hugo and Marilyn a good number of large commercial vessels went around towing boats off for little or no payment. (Please don't sue these Good Samaritans, okay?)

The most important thing, of course, is to not damage your vessel any further during the refloating. This is easier said than done. In addition, let's not ignore the damage that wrecked vessels can do to our marine environment. Eliminate such damage whenever possible, minimize it when it is unavoidable.

THE DIFFICULT WAY

Almost any unholed (floatable) vessel which is resting on a sandy or muddy bottom can be snatched off—even if it is only in a foot or so of water.

Here's how to accomplish this in capsule form: survey the bottom, clear any hidden obstructions, and determine the direction of pull required to refloat the vessel. Wrap a

stout line completely around the vessel, tying it to the rail in such a manner that it *absolutely* cannot break. Place two 'anchor pods' (groups of anchors) well away from the vessel in the direction it needs to move. Between the anchor pods and the boat put block and tackle systems which dead end at the vessel's cockpit winches.

Lighten the ship as much as possible. An hour before dead high tide, take as much strain as you possibly can on the anchor pods without breaking anything. Wade out two tow lines to one or more towing vessels that are anchored bow-out in deep water.

With maximum strain on the anchor pods, allow the towing vessels to gradually take up the strain. With lines to the top of the vessel's mast, have a group of people attempt to 'jiggle' the vessel as the strain increases: just as the tow boats are throttling up to their maximum pull, send in two or three small outboard dinghies throwing maximum wake at the beached vessel.

Even if she is very heavy and in very shallow water—she'll begin to move. If she moves even a quarter of an inch, you can get her to move an inch... and eventually get her to slide off back into deep water.

If the vessel is holed on rocks, the situation is far more complicated. She will have to be stood upright, temporarily patched, and then laid back down towards the water with sheets of plywood fastened to her sides (to prevent being holed again on the rocks as she is dragged back into deep water).

This method is crude and risky, but it has been used hundreds of times to salvage vessels that could not afford a crane.

We don't recommend doing any underwater salvage work unless you are a highly experienced, certified diver. ✓✓✓

Comments and suggestions are welcome. Write: Hurricane Booklet, Goodlander, Box 37, St. John, VI 00831

ACKNOWLEDGMENTS

Hundreds of people and dozens of organizations helped with the preparation of this book. We'd like to thank, in particular, **Charles Balch** of St. Croix for all his wonderful help. Also, **Katydid's** of St. John for the artwork.

In addition, we owe a debt of gratitude to such government agencies as DPNR, F&W, VITEMA, NPS, NOAA, SEAGRANT and the USCG.

Marine groups and businesses such as VICL, VIMI, VISAR, and WAH also assisted.

Thanks!

Special thanks goes out to Les Anderson, Chris Angel, Nick Bailey, Scotty Barnett, Clarke Beam, Bill Beer, David Bemis, Tami Bemis, Butch Berchem, Larry Best, Ken Betts, Derek Blair, Wally Bostwick, Rafe Boulon, Keryn Bryan, Jeff Carey, Marty Carlson, Wit Carter, Robin Clair, Lani Clarke, Joe Colpitt, Tom Colter, Marcus Compton, Gary Croot, Jodi Culbert, Julian Davies, Colin Day, Dave Dostal, Rick Faulkenberg, Robbie Ferron, Will Ferry, Pam Gaffin, Tom Gerker, Bobette Gladstein, Maria Gonzalez, Tom Gore, Janet Groene, Kirk Grybowski, Michael Hall, Cid Hamling, Roger Hatfield, Bill Henderson, Spike Herbert, Charlie Hemdon, Lynne Hinkey, John Holmberg, Elliot Hooper, Will Howe, Will Hudson, Jerry Immel, Keith Janssen, Jennie Jerome, Alan Johnson, Judy Knape, Dan Kowalski, Jeannie Kuich, Mike Kuich, Neil Lewis, Thatcher Lord, Vincent LoRusso, Dave Lovik, Steve Macek, LouLou Magras, Ann Marie Estes, Arlene Martel, Bruce Masterson, Ernest Mathias, Stephen Meyers, Don Miller, Alan Mohler, Sandy Mohler, Gary Moses, Harold Neels, Dennis Nixon, Kate Norfleet, Louis Ojeda, Tony Parson, Mary Pat Sica-Brown, Mike Pauley, David Pearsall, Natalie Peter, Salvatore Piazza, Geoffery Pidduck, Fletcher Pitts, Fletcher Pitts, Victoria Pope, Colin Probyn, Rick Ricardo, William Rich, El Richardson, Harold Richardson, John Ritter, Amy Roberts, Mel Rodgen, Lila Rosen., Jonathan Ruhsam, Paul Scarano, Jim Scott, Nancy Scott, Simon Scott, Fritz Seyfarth, Ted Seymour, Ron Sherwood, Bob Shinnars, Jack Simmons, Steve Simonsen, Andrew Simpson, John Smith, Lee Stanciauskas, Hap Starr, Peter Stoken, Don Street, Jim Swan, Cat Taylor, Rudy Thompson, Peter Thurley, Jaye Tulli, Rik Van Rennselaar, Bobby Velasquez, Carolyn Wardle, Randy West, Richard West, George Zamiar and dozens of other individuals who assisted us along the way. ✓✓✓

HURRICANE FLOAT PLAN

Vessel name _____

Description _____

Vessel registration number _____

Owner's name _____

Address _____

Tel/Fax _____

If owner is absent, contact _____

This vessel normally kept _____

It's intended storm harbor is _____

This passage takes () hours under normal conditions. _____

It has () number of anchors aboard. _____

In order to safely operate this vessel, remember to make sure that: _____

The key to vessel is located _____

Equipment which should be removed from vessel: _____

When leaving, remember to: _____

It is expected to anchor or moor in the following manner:

Supplies to consider: anchors, rodes, chafe guards, fenders, shackles, swivels, thimbles, exhaust plugs, duct tape, drinking water, stove & engine fuel, toolbox, first aid kit, charts, waterproof flashlights, spare batteries, candles, insect repellent, electrical fuses, assorted fasteners, WD-40, extra hose clamps, seizing wire, nails & hammer, Vice-grips, electrical wire ties, whipping twine, electrical tape, lashing line, small floats, crowbar, hatchet, thick grease, and toilet bowl wax rings (to fix emergency leaks). You can't have too many rolls of duct tape. Don't forget cash, rain gear, waterproof shoes, work gloves, and a mask and snorkel.

Keep your ship's papers, a recent photograph of your boat, an inventory of the vessel's equipment, and your insurance policy in a waterproof pouch which is easily accessible. Take it with you when you leave your boat.

PHONE DIRECTORY

Government offices
 USCG (STT) 776-3497
 USCG (PR) 1-787-729-6770
 DPNR 774-3320
 WAH 776-8282
 NPS 775-3800
 FEMA 1-800-227-2741
 VISAR 1-809-494-4357
 FISH AND WILDLIFE 775-6762
 VITEMA STT 774-2244
 STX 773-2244
 STJ 693-5050
 VI Police, Fire, Ambulance 911
 Hospital STT 776-8311
 STJ 693-8900
 STX 778-6311

COAST GUARD EMERGENCY
Shipyards *787, 789, 2041*
 Independent Boat Yard 776-0466
 Haulover Marine 776-2078
 St. Croix Marine 773-0289

Marinas
 American Yacht Harbor 775-6454
 Compass Point 775-6144
 Crown Bay 774-2255
 Green Cay 773-1453
 Limnos 775-6901
 Saga Haven 775-0520
 St. Croix Marine 773-0289
 Salt River Marine 778-9650
 Sapphire Marina 775-6100
 Vessup Point 775-9964
 Yacht Haven 774-6050

Marine Surveyors
 Associated Marine Surveyors 775-6508
 William Howe Surveys 775-6081
 Robert Shank (STX) 773-3320

Marine Supplies
 Island Marine Supply
 Red Hook 775-6621
 Crown Bay 776-0753
 Light House Marine 774-4379
 Marine Warehouse
 Crown Bay 774-8665
 Long Bay 774-2667
 Independent Boat Yard .. 779-2219
 Red Hook 775-3322
 St. Croix Marine 773-0289

Salvors and tugboats
 Immel's Towing 774-3541

Crane Companies
 Overseas Steel Fabricators .. 775-9722

SEATOW 777.4869

As of 2000
FURTHER READING

Chapman's PILOTING
 The 'Bible' of boating.

Staying Put!
 By Brian Fagan
 An in-depth look at anchoring

The Complete Book of Anchoring
 By Earl Hinz

Anchoring
 By Don Bamford

Storm Ready
 By Richard Winer
 A Guide to Hurricane Preparation

Storm Tactics
 By Lin and Larry Pardey

Complete Guide to Anchoring and Line
 By David G. Brown

Illustrated Weather for the Mariner
 By William Kotsch

Heavy Weather Guide
 By William Kotsch

Ashley's Book of Knots
 By Clifford Ashley

Advanced First Aid Afloat
 By Peter F. Eastman

The Sailor's Weather Guide
 By Jeff Markell

Oceanography and Seamanship
 By William Van Dom

Bluejacket Manual
 U.S. Navy

Annapolis Book of Sailing
 By John Rousmaniere

Seamanship
 By Bureau of Naval Personnel

Heavy Weather Sailing
 By Adlard Coles

INTERNET SOURCES

The Internet is literally brimming with information, maps, graphs and statistics on hurricanes, etc.

FEMA's WWW page is at:
<http://www.fema.gov>

NOAA's WWW page is at:
<http://www.noaa.gov/>

Hurricane information can be found at:
<http://www.usatoday.com>
<http://cirrus.spri.umich.edu/wxnet/tropical.html>
<http://grads.iges.org/pix/allhurr.gif>
<http://www.nhc.noaa.gov/>
http://lumahai.soest.hawaii.edu/Tropical_weather/tropical.shtml
<http://typhoon.atmos.colostate.edu/forecasts/hurr.long.aug95/enAug95.html>
<http://thunder.atms.purdue.edu/hurricane.html>

Tropical hurricane information will be emailed to you directly within moments of its creation by emailing:
listserv@po.uiuc.edu

and include the message:
**sub wx-trop1 YourFirstName
 YourLastName**

If further information is desired, go to a search engine such as YAHOO! at:
<http://www.yahoo.com>

and request that it find all WWW pages with the words HURRICANE and TROPICAL STORM and TYPHOON, etc.