

HURRICANE !!

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Boating Philosophy and Strategies for Hurricanes in the Florida Keys



M/V Creative Touch preparing for Hurricane Irene, Marathon Florida, 1999

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1. **Introduction:**
2. We live in Marathon Florida, right in the middle of the Keys, up a canal just off Boot Key Harbor, with our 50' trawler docked alongside. Our cruise speed is 8.5 - 10 knots. Each year we have to determine strategies for protecting the boat from every storm that threatens. We've cruised up and down the coast from the Great Lakes to the Tortugas and have had to make similar decisions all along the way. I'll not address care of your home or other property at all here, and I'll not address trailerable boats which can be easily moved from harm's way.

3. Here I want to discuss ways in which boaters should THINK about handling storms, with some specific pointers depending on which strategy you have chosen.
4. You can not guarantee that you can protect either yourself or your boat from Hurricane damage. Period. But having said that, except in the most direct and severe situations, there are many things that can be done to move oneself from harms way and/or ensure a high probability of protecting your boat. It is generally accepted, however, that riding out such storms on your boat is a BAD idea. The idea is to plan and protect your boat as much as possible in advance. THEN LEAVE. In spite of this admonition there is a considerable amount of judgment that goes into making stay or run decisions - and many people do in fact stay with their boats. We have ourselves hunkered down in the coves of the Caloosahatchee River to ride out these storms. I'm not saying that's necessarily smart. Sometimes our guardian angels watch over us in spite of our stupidity. Our first choice is to prepare and leave the boat, and we would stay only in very special circumstances. We'll discuss more about this later. 
5. The easiest and best thing to do is simply avoid Hurricane prone areas during season - technically June through November, but the "hot" times are from mid August to mid October with September the peak. In fact, that's the strategy we're going to try for this coming year's season in our trawler. We're getting tired of "puckering up" every time these gigantic maelstroms of cloud & wave come rolling in from the Caribbean. Last fall's Hurricane Irene, even though a mild storm, left my wife and daughter sleeping in the bathtub all night (tornadoes) while the waves and surge in our protected canal blew over the dock and winds gusted to 100 mph. This year we'd like to spend the summer months like typical Keys snowbirds, except in our case we'll take the boat up the Tom-Bigbee and Tenn-Tom waterways to the mountains of Knoxville TN and Smokey Mountains where we'll enjoy the cruising and adventures with the kids during Hurricane season. Except for the fact that we like to cruise like this anyway, this might be more trouble than it's worth for someone based here full time. If you're not based here full time then you might plan your cruising times to avoid Florida, Bahamas and the SE U.S. Coast during peak Hurricane season as your first level of protection.
6. Most of the locals here in the Keys hunker down and stay put for the storms, with the rationale that if they decide to run, then the storm is just as likely to change and get them where they run, as it is here, so they just prepare their boats well. There is a lot of truth to this, and we'd decide to run only if we thought it offered some clear advantage in either eluding the storm or providing a more secure spot. Usually it's the more secure spot, since it's hard to predict where the storm will actually hit. This is not the avoidance strategy discussed above; this is a coastal running strategy. In Hurricane Andrew many locals fled with their boats up to South Florida since the storm was originally supposed to hit the Keys. It veered and hit South Florida instead; leaving Keys boats spared and destroying all that had fled to South Florida. I'm not recommending that staying put yourself personally is wise all the time - just securing your boat and then deciding what to do yourself is worth some consideration. If a Category 5 Hurricane makes a direct

hit on the Keys there will be no safe place, and virtually everything will be wiped out in its path. We came close in 1999. The problem in knowing what will or will not be a "Big" storm is that there's a lot of warm water in the Gulf Stream off the Keys. It could turn from a category II to a category V storm in this last stretch before it makes landfall, giving you no realistic expectation of exiting the keys safely (all low, lots of bridges and all exposed).

7. After running or hunkering down from a dozen or more Hurricanes along the SE U.S. Coast and Florida the last few years, my personal assessment is that the vast majority of damage done to boats is caused by 1) Insurance, and 2) Complacency. One seems to feed the other. In port after port we'd see large numbers of boats that were either not attended at all, or just minimally prepared prior to storms. People just don't seem to care. We heard many remarks that people were covered by insurance, so they weren't really worried about it. The problem with this is that **THESE BOATS ARE THE MAJOR SOURCE OF DAMAGE TO OTHERS - LIKE US.** In marinas and at slips everywhere boats were minimally tied down, sometimes with only the normal bow, stern and springs they use all the time. Some had equipment, dinghies and even outboards left up on decks - to become potential missiles in the storm. Sails, though tied and covered, were left on. Once the wind works its way under the sail cover and begins to open it up (even furling sails), it's all over. We watched a sailor almost lose his life one morning at anchor during a gale off the NJ coast, when the jib on his schooner opened in the wind and starting dragging him back onto the rocks and crashing waves. He was aboard by himself trying to stow the out-of-control sail. It flapped him around in the air like he was nothing - and this was just 40-50 mph winds!
8. The other major problem that goes along with complacency is that almost no one takes the proper steps and preparation well enough in advance. With us (based on boat speed and available options) this means about a 72 hour lead time. This risky behavior of procrastination is reinforced by the fact that most of the time everything works out OK. Remember that the question is not whether a hit will occur in any given Hurricane prone location - like South Florida or the Keys. It's merely a question of **WHEN** that hit will occur and **HOW BAD** it will be. With a house you might be able to put off making preparations until the last minute if you have the supplies you need and a reliable evacuation route. Not so with a cruising boat. When you're within the forecasted strike zone of the storm within 72 hours, straight logic dictates that preparation must be started, whether the storm will actually veer off later or not. If you decide to wait to see what's going to happen, by the time you know you're in for a hit it's too late to take the proper steps to protect your boat. Remember that you have to have either enough time to run for safety in advance of the storm, or to thoroughly secure it before you evacuate yourself. If you have to secure your land property as well you might double the time. This means that the vast majority of time you'll be working your butt off to get the boat properly secured, only to find that it was unnecessary because the storm veered away. But how are you ever to know that in advance? The rational approach involves working your butt off all Hurricane season for every storm in whose 72 hour strike path you stand.

9. **Before the Storm -- In a Nutshell: To prepare for a Hurricane**

10. * Stay aware of the weather at all times and monitor the progress of ALL storms
11. * Decide upon your own "cut bait or fish" time for taking action. Ours is 72 hours.
12. * When feasible, remove yourself (boat) from the path of incoming storms
13. * When hunkering down, properly secure your boat and remove as much from decks as possible.
14. * Evacuate the area yourself after the boat is secured.

15. **Weather Awareness & Psychological Preparation**

16. This is the first and most important step. So many people just don't pay attention to what's happening in the Caribbean and Gulf during Hurricane season. When you live in Ohio this is understandable, but inexcusable if you live in Hurricane prone areas. You have to be aware before you can start implementing your own strategies. The weather channel is usually the first source for us. The weather channel, plus internet links to various sites provide excellent coverage and strike probabilities. We can even get satellite TV with the weather channel on our boat now, and most boats cruising the Bahamas have such onboard capability. Otherwise keep your marine VHF or SSB on when cruising and listen frequently to the weather channels.
17. Secondly, don't panic. When you first expose yourself to this kind of weather threat on such a routine basis it sometimes feels like the "sky is falling" - literally. That's not to say we don't feel worry or concern. Just keep it caged and do what you have to do. You should have various plans and contingencies decided IN ADVANCE, and then begin methodical implementation of your plans in plenty of time. This is a psychological aspect of enduring these storms, and having a plan of action that keeps you busy also helps strengthen you psychologically and emotionally. An important part of this is to quietly accept the potential loss of everything (except yourself and family) in worst case scenarios. This is more important than it first sounds. It gives you the opportunity to take your backup "outs" in time to save the lives of you and your family if it ever got to that point. The psychological unwillingness to "let go" at critical times can result in putting your own safety directly in jeopardy. We once heard the VHF radio calls from a man in the great lakes, whose 30+ foot fiberglass cruiser was being pounded on the boulders by six foot waves. Unable to accept the fact that the boat was going to be heavily damaged at this point no matter what, he had his wife out on the rocks trying to hold it off while he worked the controls. His wife was killed. Even when we just dock the boat, we explain to guests and crew that it's better to let the boat "crash and sink" than to lose a hand or foot. When Hurricane Georges tore through the Keys a couple years ago one guy decided to ride out the storm on Grassy Key in his trailer. He did stake it down. When it became apparent that he should get out, it was too late. Amazingly he survived. The trailer floated - was lifted off the ground and ravaged by the storm surge rushing across the Key (which incidentally wiped out several nearby block & frame buildings). The trailers stakes held like ground tackle and he rode it out as a boat. Make SURE you are willing to "let go" and give it up if the time comes, then implement your backup plans.



18. BACKUPS

19. Having backups and "outs" is an important part of the psychology of this too. As an aircraft pilot, you can't always judge in advance what the real weather risks are along your entire route. To listen to a nonpilot weather briefer sometimes, it sounds like you're guaranteed the "kiss of death" if you even think about going up. The key in avoiding psychological paralysis is to take things one step at a time with appropriate "outs" and backups in mind. If I don't have some sort of "out" before I go, I don't go. If I do have options, then I get up to see for myself how things are and make decisions accordingly. The same is true for making strategy decisions with Hurricanes. I want to always leave an out for us to get away from the weather or find very secure land shelter. If I anchor the boat in a cove or tie to mangroves, I want to know where I can leave via dinghy to find a rental car or Hurricane Shelter if needed. If I choose to run in one direction because at 72 hours I think that's the best bet, I want to have a backup plan or "out" in case I'm wrong and the storm starts bearing down on me. I can't guarantee that I'll always assess these options correctly and make the "right" decisions, but at least I've got a reasonable and logical plan - and options. Panic sets in primarily when one runs out of options and the current situation is beyond control. The key here is to try to arrange or create as many options as possible to pull out of your hat at any given time - not always possible, but without advance planning it's unlikely to happen at all. I suppose to ensure the greatest degree of safety from Hurricanes one should live in Kansas and sit on the porch (but watch out for Tornadoes!). Life is full of risks, and we all balance them in different ways. To guarantee complete safety in all situations would result in having no life at all.

20. WEATHER SOURCES

21. Besides the normal monitoring the weather channels on marine VHF radio, checking tropical weather usually starts with the Weather Channel for us. They provide excellent coverage of tropical weather during season, and is the first step toward awareness. Once a depression becomes a tropical storm (or is close enough as a depression to be of concern) we start following its forecast via the internet. The National Hurricane Center has a tropical weather section at www.nhc.noaa.gov/ that shows a strike probability graphic and five day forecast track graph. (Check our boating links pages for more weather sites – www.BootKeyHarbor.com/Weather&Time.htm) No one is perfect at predicting paths of Hurricanes, but I'm thoroughly impressed with how well they do. Last year they were pretty much right on the money. This is of tremendous benefit.

22. Remember that when you listen to the forecasters on local broadcast TV, and the Weather Channel which is much better, that they all get their information from the same place - the National Hurricane Center and NOAA. I find it better to just get it directly from the original sources over the internet. The Weather Channel is very good too because they try to present a balanced interpretation of the data - enough to give you what they are really sure of, while avoiding speculation that would cause you to prematurely jump. Except for basic awareness of the storm I find most of the local broadcast stations, even national news, to be marginally useful. They tend to sensationalize things at every opportunity for the entertainment and ratings aspect and make it more difficult to make rationale

decisions. Just stick with the National Hurricane Center or Weather Channel whenever possible, when making critical decisions. A compromising factor here is that boats that are tied in mangroves or moored generally can just get broadcast TV at most, and the Weather Channel is only on cable or satellite. Even our satellite dish on the flybridge has to come down at some point because of wind, so we're back to broadcast. I will say this though about the local stations. When the storm threat is imminent in the local area their coverage becomes much better and is being broadcast on a constant or very frequent basis. Of course having a weather radio is always important. We just don't use it when we have access to TV or internet weather. The same is true with the VHF radio warnings. We keep it on but most of our detailed information comes from elsewhere. SSB and HAM operators have good supporting nets for storm information.



23. **Basic Damage Avoidance Strategies – AVOID? Or RUN?**

24. In the "Big Picture", your options for dealing with Hurricanes boil down to derivations of three basic strategies:

- 25. * Avoiding the Hurricane Prone areas to begin with (preventive medicine)
- 26. * Running from the path of the Hurricane - or to a more secure spot.
- 27. * Hunkering down and preparing for the blow. - Marina, Anchorage, or embedded in mangroves & creeks.

28. **Avoidance:**

Remember that avoiding the Hurricane prone areas is not the same as running from the path of the storm. Here you're trying to adjust your cruising grounds to the "high ground" pretty much all Hurricane season. Snowbirds do this routinely - Heading south down the intracoastal by late fall to winter in the Keys or Bahamas, and returning to the north sometime after Easter in the spring. Heading up the rivers of Alabama, Mississippi and Tennessee would accomplish the same thing. You might get heavy rains and flooding in Tennessee from a "used up" Hurricane blowing in from the Gulf, but it's much more manageable than the coastal Hurricane itself. The unfortunate part of this is that the summer and early fall weather in the Keys and Bahamas is some of the best! The winds and water lay down. It's crystal clear, and the water temperature goes up to the high 80's - perfect for swimming and snorkeling. The price you pay for these days upon days of sheer pleasure is the chance of many hours of sheer terror should a storm bear down on you. Many cruisers from South Florida and the Keys make their month long Bahamas cruise in May and June. This does overlap into the Hurricane season some, but it's a low risk time and the weather makes Gulf Stream crossings much more pleasant.

29. **Running:**

Running from the storms means trying to place your boat somewhere out of the expected track of the worst part of the storm on short notice. By itself, trying to second guess the track of the storm this way (with its relative giant size against the small range of your boat on short notice in bad weather) is really marginal. Most people in South Florida don't do it for reasons stated previously. When we decide to run it's because we think we can get better protection somewhere else rather than in the Keys. Starting out in the Keys, most of the time for us this

means running up into the creeks of the Everglades, or past the locks in the Caloosahatchee River (Okeechobee Waterway).

30. Just running by itself to avoid a hurricane makes very little sense as a coastal strategy, unless the track is very well defined and you can go the opposite direction. The Hurricane can easily change paths and put you right back in its path. This is of course the classic and only strategy for offshore cruisers to put the largest distance between them and the "bad" side of the storm.



31. **Boiling Foam Sea Offshore in a Hurricane**

32. Running does make sense if you can get to a Hurricane Hole that offers more protection than where you are now. Even though most Key's residents do stay put for Hurricane's, there really are NO good Hurricane Holes in the Keys. Yes, protected canals and some creeks do offer some good protection, but not like a Hurricane Hole. Some people think of Boot Key Harbor as a good Hurricane Hole. It is true that this large harbor is really the only fully protected harbor in all of the Keys. This protection would soon end though if the storm surge came over Boot Key, and the Harbor and Ocean became one and the same. You also have to consider all the other boats dragging down on you and the large expanse to develop fetch. I've seen 4 foot waves in this Harbor just in a bad blow, let alone a Hurricane! Having said that, many people do ride out Hurricanes here. There are some good creeks up into Boot Key too. Except for a direct hit or a very nasty storm, the surge won't come over Boot Key most of the time and it offers good protection. The caveat is that I'm not sure which one is the time when it WILL happen.
33. Running from storms in the Keys means basically three directions - either up the East or West Coasts of Florida, or down to Cuba. Sometimes the political and emotional aspect of going to Cuba (not to mention voiding your boat insurance) precludes this as an option for many people. Trying to run from the Keys up either Florida Coast doesn't make a lot of sense to me by itself (the Hurricanes can go right over the state and get you on both sides), but it is useful in deciding which way to go to enter the Okeechobee Waterway (including Caloosahatchee River) which crosses the entire state from east to west. This means that if I do decide to run for cover behind the protected locks of the waterway, and the storm is coming off the Atlantic, I'll head up the opposite coast to keep some distance and stay on the side with calmer seas. Vice Versa if it's a gulf side storm. The nice thing about the Okeechobee waterway is that you can continue all the way through the locks

- and out the other side - keeping more options open - IF the locks are all operational. One time we had the need to continue Eastbound through the waterway because the storm track was shifting. We got partway across and found out that one lock was shut down for repairs! That closed our options pretty quickly. I should have checked before I left. Call the Corps of Engineers at the number listed on those charts. (Army Corps of Engineers – Okeechobee Waterway & Locks Information - http://www.sfwmd.gov/lo_statustrends/lo_index.html)
34. Bridges will close in the down position once the wind picks up to thirty some mph. Using the Okeechobee waterway, or way up the New River in Ft Lauderdale (another spot with very good protection) means you have to plan far enough in advance that you don't get caught with bridges blocking your route either in or out. If we choose to do this we try to be in our spot AT LEAST one full day in advance of the landfall. This eliminates the bridge opening problem, and gives us plenty of time to secure the boat in its spot, and to dinghy out if that's what we do.
 35. You must have all the charts in advance of running. Prepare early and have  the charts onboard.
 36. **Hurricane Holes for South Florida:**
 37. Hurricane holes in South Florida are the Shark River and Little Shark River in the everglades, the Okeechobee Cross-Florida waterway, the southern fork of the St Lucie River (better than northern), the northern fork of the St Lucie River (good, but southern is better) the upper reaches of the New River in Ft. Lauderdale, and Jupiter's Loxahatchee River.
 38. There are no true Hurricane Holes in the Keys. Boot Key Harbor is about as good as it gets.
 39. Here are some general guidelines for Hurricane Holes:
 40. The smaller the better. Hurricanes can kick up amazingly large seas in very small areas of water. Smaller areas also limit the number of other boats you have to worry about dragging down on you. This means that small creeks that fit like a glove are better than large harbors.
 41. It obviously should be sheltered from the direct force of the wind and resulting waves. Textbooks will tell you that it should be sheltered on ALL sides. Good Luck. When you can't find the perfect textbook Hole, pick one that offers shelter from the wind shifts which you anticipate. If you really can't guess which way, then pick one that's sheltered well from the East. Other texts have mentioned that the wind is usually worse from the East. You really need to know how to predict wind direction from the track of the storm, which we'll discuss below. This is all part of your judgment in balancing all considerations.
 42. Don't pick an area on the lee side of something that is likely to blow down or away - like billboards or large roofs. As you scope out your spot keep in mind the potential missiles from every direction. Keep an eye out for groves of coconut laden palms. A mature coconut is quite nasty at 100mph through the air!
 43. When tying off to trees try to pick ones that are securely anchored with large root systems. Palm trees are worthless for this. Mangroves are much better. Tie the lines as close to the ground as possible to minimize leverage on the tree. Do whatever you can to minimize chafe - either with chafe protection or the way you

- tie the line around the tree. Tying to trees (or anything for that matter) means having LOTS of long lines. We keep several lines of over 150 - 200 feet. One is 300 feet. I like mangroves the best here in South Florida - plus you don't have to worry about airborne coconuts.
44. When you secure in the Hole, count on the 5-10 foot storm surge. Even higher is possible. That's one reason we like the Caloosahatchee River because it's behind the locks, and storm surge does not ordinarily occur.
 45. In a worst case scenario mangroves or other plentiful small trees offer excellent protection for the hull of the boat if it would be lifted and carried over the trees. This is much better than concrete seawalls and buildings in urban areas. After Hurricane Hugo in South Carolina, some very large boats were carried miles inland by the surge. They landed in trees in the low country and were unharmed! The problem of course is getting them out. The going rate at the time for a helicopter cargo airlift was \$10,000 per boat.
 46. The Shark River and Little Shark River of the Everglades offer significant protection from the wind by the mangroves, and absence of other boats to drag on you. It's the closest real "Hurricane Hole" to the Keys. You can wind your way up the little Shark River about 10-15 miles to Tarpon Bay, but this bay is very large and could generate large waves in a storm. There are other rivers and creeks off this though, and they would offer good protection, but the mangroves are not as tall here as closer to the inlet. A good approach would be to go part way up the river, then duck into a (very) small side creek and tie your boat to mangroves all the way around. (Look at charts and Satellite photos of this area at www.bootkeyharbor.com/Tarpon%20Bay.htm). We had friends stay there for Hurricane Georges, and it blew the water totally out of Florida Bay - leaving them high and dry up the Little Shark River until the return flood. Remember that whether you get a dry bottom or terrible surge flood depends on which direction the eye goes relative to your position. The down side to these Everglades Rivers is that you're pretty much committed to riding the storm out on your boat. There is no reasonable landside access for exit. Flamingo is about the closest place. The VHF radio is out of range of most all land stations except for Flamingo - and if they evacuate then there is no one to listen. You are also outside of cellular phone and broadcast TV range. It's a good spot, but you pretty much have to stay. Don't forget LOTS of mosquito repellent too!
 47. The Caloosahatchee River offers protection from the storm surge because of the locks up the river. This is part of the Okeechobee waterway that spans Florida's East and West Coast through Lake Okeechobee. There are marinas up the river past the locks, but if we go to all the trouble to get there to begin with then small creeks and coves afford more protection. Remember, the smaller the creek or cove the better it is, even if you have to put up with mosquitoes. There are more options on the Western side of the Okeechobee waterway (the Caloosahatchee River) than the Eastern side (except for the St Lucie River). This is because the Caloosahatchee is a natural river that meandered through the countryside. When the corps of engineers made the waterway they dredged straight cutouts in many portions of the river to eliminate all the winding. This left all these unused portions as small little canals and coves to snuggle into. They are frequently

- overgrown with weeds but are useable. If you are planning to secure and then leave your boat, there are several marinas up the river. If you want a slip (not as protected as a cove or creek) then you must call WELL in advance to get a spot. Don't count on getting one if you call three days ahead. You can speak to them about using their marina to dinghy back to after your boat is secured, where you can have a car waiting or arrange for a rental car. All of this must be done well enough in advance to avoid the bridges locking down.
48. The upper reaches of the New River in Fort Lauderdale offer considerable protection, but it's a long way back and you have to plan on all the bridges. The Southern Fork of the St Lucie River is one long series of outstanding Hurricane shelters. The Northern Fork isn't as good as the Southern, but does offer some good protection. Jupiter's Loxahatchee River penetrates deep into the interior. 
 49. **Where to "Hunker Down" - and what causes damage.**
 50. **Marinas:** It's interesting to note that most damage occurs in Marinas. This is due primarily to all the other boats that are not well attended, and to the proximity of docks and pilings. My judgment is to avoid Marinas if you can, but sometimes this is still the best route depending on your options. It depends - on your alternatives of close-by safe anchorage or mooring, your ability to get to shore if you choose such anchorage or mooring, the physical construction of the marina and docks, and your options for evacuation once you've prepared your boat. Nothing is cast in concrete, but remember that marinas frequently result in a lot of damage. Some marinas won't even let you stay during a hurricane. If you get a slip in a hurricane prone area make sure you check in advance on their policy.
 51. Like anchorages, once a boat breaks loose in a marina everything in its path will be torn loose and damaged. More so, everything loose on the decks of other boats will become missiles resulting in lots of damage to your boat even if it stays tied secured. Marinas are so risky because of the higher density of boats over anchorages. There's a good chance that at least one will break loose and come down on you.
 52. Aside from wind, the real problem in the Marinas is a high surge. You should plan on 5-10 feet anyway, and previous directors of the National Hurricane Center have predicted that a storm surge of as high as 25 feet is possible for South Florida in a Category 5 Storm! Now, take a look around your marina with a 10 foot storm surge in mind. Look at the height of pilings, and imagine the stretch on lines to accommodate a 10 foot rise of the boat. This surge will break other boats loose, and cause you to go up on the pilings. The surge is one reason we like the protection of the locks in the Okeechobee waterway.
 53. Assuming your lines stay secure at the marina and another boat doesn't come down on you, a real killer is dock pilings. Boats get driven up very high with surge and waves. If lines snap and they get laterally displaced, the boat may be driven down on top of a piling. This will pierce the hull of a boat just like a spear. Even if you're not shish-ka-bob-ed, constant pounding against these pilings or the seawall will do significant damage. Lines must be tied to accommodate this significant rise in water level and allow the boat to remain in the middle of the slip - if another boat doesn't come down on it to force it onto the piling. A major

- problem is not enough length on dock lines so that when the surge hits it snaps the lines. Unless you've actually seen your boat riding in a Hurricane, you will ALWAYS need more length on the dock lines than you think you do - pulled as tight as you can get. Trust me on this one. There is no such thing as too many lines either. Another aspect of this is fixed versus floating docks. As you might imagine, floating docks always keep the tension and length on the lines to docks the same. You have to be concerned it doesn't float off the top of the pilings, but if they're high enough it's best on your lines. Fixed docks cause the dock lines to stretch considerably when the high surge comes in - therefore the longer the better so they don't snap under the stress. One of the best Hurricane Holes with concrete floating docks we ever stayed in was in Brunswick Georgia. 22 lines off the boat!!
54. Sea walls (wharves and quays) present more of a problem in securing the boat. Unless there are pilings driven alongside off the wall to create a slip, you can only run kedge anchors off your beam to hold you in place. This can certainly work, but I'm less confident with this than using pilings directly. At anchor you can afford to drag a few feet. On a sea wall dragging the kedges a few feet can destroy your boat by pounding on the wall. If it's a narrow canal then you should tie to something solid on the other side. This requires talking to the property owner in advance, and not prematurely blocking a canal with your lines. We've heard of irate boaters up the canal cutting lines when their canal was prematurely blocked, preventing them from leaving or returning.
55. Line chafing is the major cause for lines snapping at either docks or moorings. The surge will snap them, but the constant "bucking" of the boat will chafe them through. There are a variety of ways to make good chafe protectors around your lines. Learn to use them. Short lengths of hoses through which the lines pass make excellent protectors. If it's tight fitting plastic hoses though, the friction can generate enough heat to melt the line & hose, so oversize the hose on the line. I recently saw an article about using old fire hose as chafe protectors. The author said you can go to local fire stations and ask them to save hose they might be discarding. This sounds like a much better idea. 
56. **Anchorages:** At anchor or at moorings, assuming the boat is very secure and doesn't drag onto the Lee shore, the biggest risk is from other boats which break loose and bear down on your own boat. Frequently these boats too are poorly attended and ill prepared. Large protected harbors are very good themselves as some protection, but you can't predict which boats will drag and which won't - and large harbors have lots water to get kicked up. The best course is to find the smallest protected harbors and coves with no other boats, or to anchor securely on what you guess will be the windward side of the harbor. The smaller the area the better. Protect yourself by getting in corners or canals or coves where other boats won't come down on you, and where there's no great distance for fetch. If you guess right (wind directions and protection) and are well anchored there will be no risks of other boats blowing down on you. If you guess right but you drag, then you're a risk to others and yourself. If you guess wrong and you're downwind, you're a target for all the other less secure boats. Remember though that there are worse things than dragging into the mangroves, if you don't collide with other boats resulting in significant damage. You may take a tow or other rescue efforts

from Mangroves if you drag into them, but the damage will be minimized. We once anchored in a small alligator inhabited cove in preparation for the onslaught of the storm. There were two sailboats there already and our cruiser pretty much took the last corner. The sailors both rowed over to help us lay out anchors, and one was exceptionally helpful to us - even getting himself muddy from head to toe helping us get anchors properly set. When I thanked him profusely for the help, he told me that he'd like to say it was because he was such a generous guy and very unselfish. He said the truth of the matter though, was that if he helped me secure our boat, he was more confident that it would stay put and wouldn't drag down on him! - Smart man. We had a great celebration feast on our aft deck after the storm had passed.

57. The standard method of putting out two anchors is to place two of them about 45-60 degrees apart into the expected wind direction. Placement of three anchors would encircle the boat with anchors out every 60 degrees. The problem with this if you bring all the rodes back onto the bow is that your rudder or props can foul on one of the slack rodes as the wind shifts, unless it's firmly weighted to the bottom. A preferred alternative involves chaining or shackling the three rodes together after they're securely dug in and set, then leading a single chain (or oversized rode) back onto the bow. Adding a heavy catenary of some type (like a 5 gallon bucket filled with concrete) to the point where they're shackled helps ensure they stay flat on the bottom. This is a very secure mooring. If a chain is used to lead back to the bow, then a long nylon snubber line must be used to absorb the shock. Don't forget to take extra precautions with chafe protection where the snubber line, or nylon rode, comes back onboard. It doesn't take long for even 3/4 inch unprotected nylon to chafe through. You do of course have to match the type of anchors with the bottom, and find a good holding bottom. The heavier the anchor the better. This is where the 75-100 pound fisherman's storm anchors come in really handy. Your best or heaviest anchor should be in the direction where you expect the strongest wind. If you have enough anchors you can also "back-up" the front anchor by chaining a second anchor in tandem with it. So far we've had very good luck with our 66 pound Bruce in 60 knot winds. If your anchors hold well, the problem then will be to dig them out of the bottom after the storm! My opinion is that cruising boats should have a minimum of three good anchors available, with two of them out on deck and ready to go at any moment.
58. There is a slight derivation to the mooring arrangement mentioned above if you're in a small cove or close to trees on shore. You can run a long line(s) from the base of a tree on shore back out to your mooring shackle, with this line treated just as if it were another anchor. You could of course run lines from shore directly onto your boat, but the idea at anchor is to create a mooring where you can swing with the wind. If you do want to securely tie yourself so that you don't swing, I'd suggest getting up very close to shore or going into a creek. 
59. **Creeks and Canals:** The best is to find a very small "one boat" creek to snuggle into. If you're into longer or wider creeks, then try to go back as far as you can to tie in so that you do leave room for others if the creek supports it. Whiskey creek on Boot Key is an example. It has two nice little side creeks at the

end of Whisky Creek. Some have gone back and secured their boats early, but not all the way back. When others have tried to find refuge they've found the creeks blocked. Ensuing words have resulted in loaded shotguns being displayed on deck. Be aware that staking a claim in a protected area can be a very stressful and emotional issue. First choice is to find a small place all by yourself. The small side creeks up the Shark River in the Everglades, and the Okeechobee waterway are excellent for these dinky little creeks. The only disadvantage is that you're so nestled into the creek and mangroves that the trees and bushes are probably brushing right up alongside your boat - along with all the zillions of mosquitoes and bugs. An anchorage is not as secure as these tiny creeks but at least you get some breeze (maybe too much during the storm!). These small creeks can eliminate the single biggest problem with Hurricane damage - other boats dragging down on you. Use as many lines, and as long as lines as you can to tie the boat into the mangroves. Here you won't be swinging like at anchor, and the mangroves should offer some protection from the wind. If it's a really small creek, I prefer to stern in so that my bow is facing any exposed area out of the creek mouth as long as the expected wind direction isn't then into my stern.

60. If you tie up across residential canals work it out in advance with your neighbors so you can tie to something on their property, and not block anyone in who is going to be moving their boat. When we tie up in the canal we run the lines early, but then weight them down so they sink and don't block the canal for anyone. Then, as the time gets short we draw the lines up tight and secure the boat.



61.

62. Our side canal dead ends onto a small bridge with concrete posts supporting the guard rails. This is our arrangement for securing stern lines to the bridge. The shots below show our other lines.

63. We like the security of the concrete posts, but are worried about chafing through the line. Since our canal faces into the open water of the harbor we are also concerned about surges and stress on the lines causing them to snap. To solve this problem with our stern lines we use the rubber tires between the boat lines and a chain around the concrete piles. First we duct tape all around the old tire to make it easier (cleaner) to work with and provide more chafe resistance to the line. Then we place chain around the piling and through the center of the tire using a "C" link to join the free ends of the chain. Finally the stern lines are pulled as tight as we can get them and tied through the opening in the tire. When the surge builds up the tire stretches to provide some give, but is very strong and secure. (We also have about 16 other lines on the boat besides these stern lines).



64.

65. As you can see here, we use VERY long lines to tie up.



66.

67. Here you can see the lines going all the way across the dock and patio to be tied up on the other side. Two anchor lines were also placed down the canal at angles. This was during Hurricane Irene (100MPH winds). The water was up over the dock you see here and the deck of the boat riding well above the windows of the house.



68. Dinghies

69. Needless to say, get your rigid or inflatable dinghies off the decks and stored somewhere. If you're anchoring out or tying up in creeks then you may need your dinghy to get back out once you're secure. You'll still have to secure your dink where ever you make your exit, and theft is of some consideration too, depending on where you are. We carry a long locking cable with us for some level of security. If you're staying on your boat then you'll need to secure the dingy so it doesn't go flying off or beat your boat to death. If we're swinging on a mooring then I'll run one or two 1/2 inch lines from the stern to the dinghy, then prepare it. I take out the battery (to ensure we have a working one after the storm), seats, oars and anything else that's loose. If your engine is a smaller outboard then bring it onboard. Ours is a larger one bolted on the transom, so it stays on. We then allow the dinghy to fill with water, either by the flooding rains, or intentionally pulling the drain plug. Ours is a whaler so it won't sink to the bottom. If you can bring your inflatable onboard then that's the safest. Otherwise slightly deflate the

tubes, and then fill it with water too. The advantage to this is that you're unlikely to lose the dinghy by it blowing away, or having it tear up your big boat if it's alongside. The disadvantage is that you don't have immediate access to the dinghy if you want it. Many people will bring their dinghies alongside like a hip tow, then fender it and tie it securely alongside. Your choice.

70. WIND DIRECTION & WEATHER:

You must be able to predict the wind direction and how it will shift during the storm. This is important for setting anchors or choosing the best "Hole". If you knew the track of the storm center with certainty then you'd know exactly which way the wind would be shifting. The problem of course is the variability of the storm track. If the track is projected to pass well on one side or another of you then the odds of guessing correctly markedly improve. The storm may change track some, but will likely still be on the same side of you. If it's bearing straight down on you and hits, then you have the worst of everything. You'll get wind from two opposite directions and at the highest intensity. If it's bearing straight down on you but then shifts one side or the other, the winds will be different depending on which side it goes. This makes it harder to plan in advance because it's apt to change at the last minute - so there you try to prepare for everything.

71. A little bit of weather 101 for those that aren't clear on wind circulation: A Hurricane is a gigantic low pressure system. In the Northern Hemisphere of our planet the wind circulates counterclockwise around a low. This means that if you are looking straight at the center of the storm and lift your left arm directly out from your body, the wind is coming from that direction. Actually it comes at a slight angle to this, so lift out your arm then move it backwards 10 degrees or so. This is the wind direction - where it comes FROM. You are pointing into the wind.



72.

73. Make your plans for securing the boat by performing this exercise as the storm approaches. Out on deck or outside where you'll be securing it, gaze toward the direction of where the storm center is projected to be about 1 day from its point of closest approach to your position. Lift your left arm up and back a little. This is the wind direction for which you should first start planning. Then turn your body so that your gaze follows the projected path of the storm. As your arm turns with your body, it points to the direction of the wind shift. Secure yourself with this wind pattern in mind. Look all around you through this arc of wind shift. See if there is enough water exposure to develop significant fetch and waves. Look for loose objects and potential missiles. Plan your lines according to the expected arc of the wind. If you gaze at where the storm center is supposed to be at its closest approach, this is the direction where the wind should be the strongest. Because

Hurricanes usually travel East to West, or Southeast to Northwest, the strongest portion of the storm will be on the North, or Northeast side of the storm. This is where the wind velocity from the circulation combines with the forward speed of the storm. Here in the Keys though they can also start in the Gulf and go West, or come up from the South over Cuba.

74. For those that have never gone through a Hurricane, it's not a homogenous increase in wind and storm. Bands of thunderstorms make up the arms of the Hurricane, so the weather you will experience will be "on again", "off again" weather as the bands come through. Each band will get progressively worse as the storm nears. Tornadoes are often as much of a threat as any other part of the storm. If you've opted to stay with your boat you don't have a lot of choices to hide from a tornado - like running to the basement or hiding in a bathtub. About all you can do at that point is watch and pray. You can get below decks, or between port and starboard engines, to protect yourself from missiles from the Tornado, but a direct hit would likely destroy everything. If you're lucky and the storm doesn't pass too closely, you'll mostly have 12 hours or so of nasty weather, storms and winds gusting to 50-60 knots. That's if you're lucky.



75. This is if you're NOT so lucky - Hurricane Hugo in SC in 1989. This is our house after the eye passed over the day before (Summerville). We did leave for this one. Here I had to fly an airplane out to protect it rather than the boat. The neighborhood looked like a war zone. It was weeks before we got electricity or phones. Chain saw droning and removing tree trunks from inside your house was the rule. Winds were 185+mph. I can't imagine being onboard the boat for that. The Navy put their ships out to sea. The neighbors stayed put with their 2 twin toddlers. Before we left he talked like it was no big deal - just a little noise and

wind. When we came back they were visibly shaken. They had slept (or tried to) the entire night in the hallway with a mattress over them. The roaring and crashes were deafening they said, and they didn't know when the next one was going to take their house and family out with it. Surrounding houses lost entire portions of their structures including whole floors. Tornados caused as much damage as the eye wall itself. For weeks after it was listening to the sound of the generator we brought back (with gasoline), the drone of the chainsaws (more serious injuries with these following the storm than by the storm itself), eating boiled peanuts by camping lantern, and enduring the mosquitoes and heat.



76. Staying aboard

77. If I could know in advance with certainty what level the Hurricane would be when it reached me, then I'd have no hesitation at all in riding out Category I storms in a well prepared boat. Many people will do the same for Category II storms, and even though I would consider it, it would be with some hesitation. Forget it after that. Category III and higher Hurricanes are quite nasty. Those that do stay with a boat during these storms rationalize it by saying that the storm track is not bearing directly on them, so they won't get the full force. It will only be like the Category I or II. If the track stays as projected then they're right. If the track changes it could get very bad. This is where options come in again. If you have a very accessible exit route then you can afford to stay with the boat until you see that it's a problem, because you have a good way out. There is no good way out of the Keys if you wait until the last minute.
78. Every bit of written advice you will see anywhere will tell you in no unmistakable terms to LEAVE YOUR BOAT. I am not your mother however, and I'm a firm believer that every competent adult should make their own decisions. I've seen pros and cons for both sides of this controversy. I have several friends who stay on their boats in Boot Key Harbor during Hurricanes or run to the Everglades. But I also think the outcomes depend as much on luck (assuming fantastic preparation to begin with) as it does anything else. The argument that is made for staying with your boat is that you're able to tend to things as they happen, improving your chance of avoiding damage. At anchor for example you can start your engines to help relieve stress on the anchor rode. If a boat is dragging down on you (and if you can even see it) then you can use your engines to swing your boat left and right and veer out of its way. When anchored way out in the boonies or up small creeks it might become very inconvenient to find a way or place to dinghy out and get anywhere. Boat security is also a question when it's left way out somewhere unattended. I think staying on your boat when it's nestled up these small creeks is about as weather safe as anywhere. But then again, what happens if that 25 foot surge DOES come inland. I've also heard people who have stayed on their boats say that there was nothing they could do with the boat in the height of the storm anyway. They couldn't get on deck to do anything there. They couldn't see anything because of either driving rain or darkness. Tension is so great on lines that any adjustment is impossible even if you can get to them. The rain becomes cutting at high wind speeds and the sound is deafening. At 60 knots I've had to don a diving mask to stand on deck to look for other boats - even then it was very

painful to my skin. I guess it comes back to how bad the weather is going to be. If it's a Category I (maybe a II), or if it's a III at some distance so you don't get the full force, then staying on your boat could be useful and is no worse than other bad storms you may have ridden out. BUT - how can you ever know enough in advance to be safe. Remember that last stretch of warm Gulf Stream water before the storm hits the Keys. If you judge wrong and the intensity picks up - there is no last minute way out of the Florida Keys.

79. End

