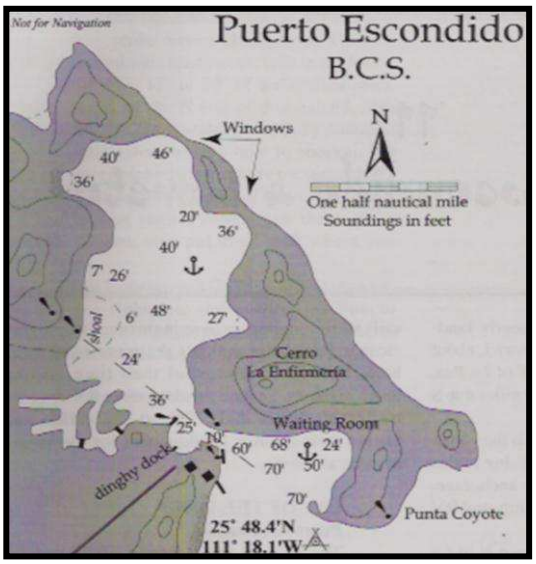
SUPPLEMENT TO STAYING PUT – GROUND TACKLE FOR A HURRICANE: BOAT-BY-BOAT DETAILS

By Carolyn Shearlock

Hurricane Marty and Puerto Escondido

IMPORTANT NOTE: The configuration of Puerto Escondido has changed considerable since 2004. There is now a marina there, and new moorings – I believe that the entire inner harbor is now moorings. The information from the boats that were there is still good, but realize that it has changed if you plan to go there. Check with cruisers who have current knowledge of the condition of the moorings, etc.



The forecasts had called for the center of Hurricane Marty to be about 60 miles to the east of Puerto Escondido. With that scenario, winds would have come from the east, then northeast, then north, then northwest and finally west. The storm actually came directly overhead. We had winds from the north, the calm at the eye, then winds from the south. When the eye passed overhead, a number of boats thought that the storm was ending.

The inner harbor of Puerto Escondido has always been considered a great hurricane hole – to the west are the Gigante mountains, towering over 3000 feet. The north, west and south are also protected by high hills, and the entrance channel is only 65 feet wide and twisty. There are only two vulnerable spots where wind can enter, called

the "windows" – areas of low land connecting the hills. However, even these low land bridges block the open fetch of waves, although many boats reported seeing 4 to 6 foot waves. The anchorage itself is about a mile in diameter. Just outside the entrance channel is the "Waiting Room" which has less protection from the south, but more from the north – or so cruisers thought. In this, the first hurricane to directly hit Puerto Escondido, they discovered that the hurricane force winds coming out of the north and northeast tended to funnel through the entrance channel and slam into the boats in the Waiting Room. In general, these boats had a rougher time than those in the Inner Harbor.

Most of the inner harbor has a mud bottom, generally about 45' deep except in the few coves shown in the chart taken from John Rains' "Mexico Boating Guide." Most of the shore is rocky, although there are patches of mangroves. The Waiting Room is primarily sand bottom and is surrounded by mangroves. There is a rock jetty on the north side of the ellipse where the dinghy dock is; the ellipse itself is surrounded by a concrete seawall which also borders the west side of the Waiting Room.

Several years ago, The Moorings had a charter base here and many of their old moorings still lie on the bottom. Cruisers have discovered these and used them over the years, believing them to be solid. Other moorings have been created more recently. Probably somewhere around a quarter of the boats in Puerto Escondido during Hurricane Marty used moorings. The rest of the boats were on conventional anchoring systems.

Boats on Moorings

41' Hardin Ketch, 14 tons, 2 people aboard in the Waiting Room, 6' waves

Gear used: Bridle from mooring to port and starboard cleats, 1¼" rubber hose as chafe gear, put chafe gear on bridle where it would hit across bobstay (boat has dolphin striker so bobstay is low to water), no strain on bow rollers

Problems: Discovered after storm that swivel on mooring gave way and safety line (attached by boat owner just prior to storm when he dove to check connections) took entire strain. As it stretched, boat came within 15' of shore. Heeled 50° a few times.

Left on deck: Dinghy motor and dodger

Actions taken:	First half:	Checked on chafe gear when possible
	Eye:	Thought it was all over and almost put engine on dinghy to help others
	Second half:	Hung on again but had a better ride than in first half

Overall feeling: Stretching of the safety line was my biggest concern as our stern was 15 feet from the rocks.

Comments: Heavy puffs coming from different directions. 6' waves. Chose anchoring location based on forecast that storm would be to east of us. Instead of mostly east winds, had north and south winds, resulting in long fetch and larger waves. Make sure you strip everything above deck.

Ericson 36C, 11 tons, 2 people aboard in the Waiting Room, 6' waves

Gear used: Mooring had 50' rode; after boat began dragging mooring, deployed 35-pound CQR on 300' chain rode (185' used) with short snubber attached with chain hook, otherwise load on bow rollers, old fire hose used as chafe gear; also deployed 24-pound Danforth on 20' chain and 300' line (20' chain and 100' rope used), attached to Samson post, no chafe gear.

Problems: Boat dragged mooring, started engine, could not stop drag, put out CQR first then added Danforth to stop drag and avoid another boat that was dragging. Got within 8" of mangroves. Dinghy cover blew off and fouled prop. Many knockdowns. Lost dinghy seats and motor cover.

Left on deck: Dinghy, motor and everything in it.

Actions taken: First half: Watched from inside until boat began to drag, started motor (no help), put out primary anchor and then second anchor to clear other boat that was dragging.
Eye: Removed dinghy cover fro prop and took in 10' of chain.
Second half: Sat and watched, wind was much lighter with gusts only to 60-70 knots.

Overall feeling about ground tackle: Should have anchored from the start instead of using mooring.

Comments: What a ride! Glad it went fast and I'd just as soon not do it again. Wind picked up earlier than expected, still had motor and other stuff on dinghy. Don't leave stuff in dinghy. I put an eye to hold the dinghy in addition to the handles. Handle gave way so eye saved the dinghy. Don't drill to put eye too close to the rubber – just a suggestion.

41' Hardin Sea Wolf Ketch, 14 tons, 2 people aboard in the Waiting Room, 4' waves

Gear used: Mooring was 1'x1'x8' concrete pillar with 70' rode of 1¼" polypro, bridle of 1¼" mega braid triple clove hitched to Samson posts, fire hose as chafe gear; when began to draf mooring, also deployed 45-pound CQR on 50' of 5/16" chain and 5/8" rope rode (175' total used) and fire hose as chafe gear and 44 pound Bruce on 270' of 5/16" chain (175' used) with 1" triple braid nylon as snubber with reinforced vinyl hose as chafe gear, attached to Samson posts

Problems: Dragged mooring 200', put out CQR, then Bruce, motored 8 hours. Rodes wrapped (took many hours and two divers to untangle after the storm). Clipper bow swung a lot as we motored forward to take strain off mooring. Heeled 40° with gunwale in water 12 to 15 times. Dodger stitching took grief and bookcase came off wall below. Took a day – and two divers – to untangle the mooring and anchors after the storm.

Left on deck: Dodger, dinghy motor, life raft, cockpit windscreen, mizzen sail, wrapped CQR

Actions taken:
First half: CQR deployed and motored
Eye: Put out Bruce in addition
Second half: Motored

Overall feeling about ground tackle: Mooring block was much too small for vessel.

Comments: Captain should dive on ground tackle to verify all connections, size of mooring or that anchors are well set prior to storm. Multiple anchors must be set carefully anticipating wind and wave direction, otherwise multiple anchors can foul. Single anchor is risky because weak link in chain goes and you are "gone." Check chafe often.

36' Trawler, 17 tons, 1 person on board during second half of storm, in the Inner Harbor

Gear used: 350-pound Navy Danforth with 400' of 5/8" chain – 150' of chain out, then remainer made into a large ball weighing approximately 1000 pounds. 85' of 3/8" chain attached to this, then 3 lines of yacht braid tied on and brought to boat through hawse holes and cleated at hawse holes.

Problems: No problems other than awning shredded by bungee cords blowing in the wind (storm started earlier than expected and I was off the boat and couldn't get back on until the eye passed over)

Left on deck: Awnings

Actions taken:	First half:	Not on boat, had gone to help someone else and couldn't re-board
	Eye:	Got back aboard, removed canvas and put stabilizers out
	Second half:	Watched and waited

Overall feeling about ground tackle: Very good

Comments: Once the storm begins, you can't help others and no one else can help you – you just can't get to other boats. It was very helpful to have been aboard during other hurricanes and tropical storms.

42' trimaran, 9 tons, 2 people aboard during first half, 1 during second half in Inner Harbor

Gear used: Large concrete block as anchor with chafe gear

Problems: None

Left on deck: Panga in water behind boat

Actions taken: None, just watched. Checked on other boats during the eye.

Overall feeling about ground tackle: Very good.

Comments: Do not want to do again.

40' Sampson, 12½ tons, 2 people aboard for second half of storm, in Cocktail Cove in Inner Harbor

Gear used: 3-point mooring with bridle secured to windlass with a safety line around the mast. Snubber attached to 2 cleats on deck and to the mooring line. No chafe gear.

Problems: Bridle wore through new Samson braid; rudder damaged

Left on deck: Nothing

Actions taken: First half: Ashore helping other boats
Eye: Returned to boat
Second half: Watched and waited

Overall feeling about ground tackle: Good

Comments: None

42' Hylas, 10 tons, 2 people aboard in the Waiting Room

Gear used: ¾" triple braid bridle from mooring attached to port and starboard bow cleats, reinforced hose secured to line with cinch knot as chafe gear

Problems: None; one decorative item below broke; no knockdowns but sudden gusts heeled boat over quite a ways

Left on deck: Dodger and bimini; dodger removed shortly after storm began

Actions taken: First half: Kept watch on other boats and chafe gear, took down dodger, slid chafe gear back into place
Eye: Check chafe gear
Second half: Check chafe gear, during last half hour of storm got a small amount of chafe

Overall feeling about ground tackle: Great

Comments: We dove on the mooring before the hurricane to make sure it could hold us. We replaced a pin and all was well. If you use a mooring, dive on it yourself!! We believe that stripping <u>everything</u> off the deck helped a lot – think "be small."

Boats on CQR/Plow/Delta anchors

36' Mariner Yachts of New Hampshire, 2 people on board in the Inner Harbor

Gear Used: Delta Quick Set 33#, 300' 5/16" Hi-Test chain, in tandem with 35# Danforth-design West Marine HT, attached with 20' of 5/16" Hi-Test chain, shackled to trip line attachment point on Delta. 25 feet 5/8 three strand nylon double bridle through port and starboard chocks onto 10 inch cleats with cut pieces of fire hose through chocks. Anchored in 45'.

Problems: Dragged 150 feet early in the storm and was close to a lee shore. Moved chafe gear twice.

Left on deck: Unknown

Actions taken:
First half: During height of first half of storm, boat started dragging as indicated by GPS alarm. Started engine, wife at helm, as I proceeded to clip on to jack line and go to bow to pull up anchor and move further away from lee shore to reset. It was very difficult to keep bow into wind, but we zig, zagged back and forth to port and upon letting boat drift back, payed out all 300 feet of chain, paying attention to let first anchor (Danforth) hit bottom and continue aft until main anchor hit and slowly let anchors dig into mud by keeping power up on engine until fully buried and set in mud. Backed down hard for two minutes along with 50 knot winds.

Eye: Took time to finalize rigging cockpit deployable emergency anchor with chain and nylon rode.
Second half: None needed.

Overall feeling about ground tackle: Adequate for poor holding conditions in Puerto Escondido.

Other comments:

1. Initial set of tandem anchors was in preparation for wind to come from different direction. Hurricane changed track and came from different direction. Next time I would wait until hurricane was closer to set anchors.
2. When wind gusts were approaching 70-80 mph, I would perhaps use engine to take strain off of ground tackle during inital gusts.
3. In final analysis, I believe the attachment point was incorrect for the kedge (Danforth) anchor to the Delta. The trip line hole was used and it should have been at either the main anchor shank shackle or further up the anchor rode.
4. I believe I will go back to my 45#CPR to replace the Delta used as main anchor and use the Delta as the back up anchor instead. In truthfulness, I believe I would now buy and use an even larger anchor as main anchor, the largest the anchor platform will hold.
5. The extremely muddy conditions in Puerto Escondido make holding very difficult in hurricane force winds. I still believe the tandem anchor is a good way to go if the attachment points are correct and set is correct for expected wind direction.
6. I'd also wear long pants next time. I wore my knees to bloodiness by being on the foredeck for 1½ hours being tossed by the pitching boat and boarding waves over the bow.
7. Although we were near the center of the harbor, I was amazed with the size of the waves we were experiencing. I will keep this in mind next time to be prepared.
8. We both used dive masks in order to see when out on deck and that worked well.
9. I need to try and figure out how to keep the boat from coming so far off the wind between gusts. We would fall off up to 60 degrees at times.

True North 34, 13 tons, two people on board initially in center of inner harbor

Gear Used: 60 pound Plow (not a true CQR), on 270' of 5/16" Hi-Test chain, ½" nylon snubber lines through hawse holes in hull with rubber hose as chafe gear. In second half, deployed 35-pound Plow made by Danforth on 60' of 5/16" Hi-Test chain and 140' of ¾" nylon rode, no snubber or chafe gear. Anchored in 42'.

Problems: Anchor originally set in opposite direction to first half winds. Believe that vessel went directly over top of anchor and plucked it out. Bobstay chafed through the hose on the snubber in 2 to

3 hours. Dragged 1000 yards, anchor reset several times but never held. Motoring forward when anchor did catch was bad – tended to put slack in the rode, then bow would fall off and jerk the tackle. Once anchor was dragging, tried to motor forward but could not make forward progress – we slalomed downwind which slowed our approach to the rocks. Could not deploy second anchor as wife was not strong enough to handle tiller steering or foredeck work.

Left on deck: Unknown

Actions taken:
First half: Motored to avoid hitting vessels to leeward or fouling their tackle. Got boat stopped and reset once, but it didn't last. We were within minutes of abandoning boat before going on the rocks when the eye came.
Eye: Relocated to original location, reset same anchor but insufficient time to bury it.
Second half: Dragged and motored to reduce pull on tackle. When we did get anchor to bite briefly, put engine in neutral to avoid putting slack in rode.

Overall feeling about ground tackle: Plow didn't work in the soft mud. Needed a Bruce or Danforth type.

Other comments: My own informal survey indicates that almost all (maybe all) boats with Plow-type anchors dragged to some degree. Bruce anchors fared better.

Cal 34, 8 tons, 2 people on board in front of southeast window in Inner Harbor, 4 – 6 foot waves

Gear Used: 35 pound Plow anchor in tandem (on same rode) with 30 pound Danforth, on 230' of 5/16" chain. Snubber was 9/16" double braid attached with a chain hook. Old fire hose on snubber as chafe gear. Strain was on bow rollers. Anchored in 42'.

Problems: Had to retie dinghy on deck, when wind swung, boat was a little too close to shore for comfort. Shank on Danforth bent.

Left on deck: Dinghy, dodger, jerry cans, Life Sling, MOB pole, propane canisters

Actions taken:
First half: Manned rudder to try to help keep bow into wind, retied dinghy on deck, motored a little just before the eye came over to keep clearance between stern and shore.
Eye: Checked chafe gear and pulled in 15 – 20 feet of chain.
Second half: Just rode it out.

Overall feeling about ground tackle: It worked really well, but I think I would have felt better if I had heavier ground tackle and larger anchors for primary and secondary anchors (maybe a large Fortress).

Other comments: I'd make sure I have 360° clearance of all objects.

C.S. Sloop, 3¼ tons, 1 person aboard in Inner Harbor

Gear Used: 25 pound CQR on 60' of 5/16" chain and 130' of 5/8" nylon line, 30 pound kellet on ½" retrieval line; secondary anchor 22-pound Danforth on 60' of ¼" chain and 200' of ½" nylon line (not certain how much deployed); no snubber or bridle, no chafe gear. Anchored in approximately 50'.

Problems: Anchor rode jumped off roller and nearly parted, dragged, second anchor deployed from stern fouled propeller.

Left on deck: Dinghy motor

Actions taken:
First half: Placed Vise-Grips on rode beyond frayed area so that when it broke the Vise-Grips would prevent the rode from passing by the kellet that was attached to the rode by a ½" line secured on deck.
Eye: Pulled in rode 3 feet and reattached to cleat, put bail across top of bow roller. Unwound second anchor rode from prop and pulled it up.
Second half: Relaxed.

Overall feeling about ground tackle: Good – but it could have been used better.

Other comments: Don't attach your second anchor to the stern. Drop it there but have it attached to the bow.

45' Spray, 22 tons, 2 people on board in the center of the Inner Harbor

Gear Used: 60 pound CQR on 350' of 3/8" BBB chain. Single snubber of ¾" 3-strand nylon, secured with a rolling hitch. A single layer of reinforced water hose used for chafe gear, over the bow roller. Anchord in 48'.

Problems: Replaced snubber, moved lead to reduce chafe

Left on deck: Main and mizzen sails were tied, jerry cans, dodger, outboard motor, 2 generators, MOB pole, BBQ, dinghy in water

Actions taken:	First half:	Replaced snubber, changed lead
	Eye:	Inspected snubber
	Second half:	Motored briefly to maintain clearance with another boat

Overall feeling about ground tackle: Can't use too much chain!

Other comments: None.

Boats on Bruce/Claw anchors

Tayana 42, 15 tons, 2 people on board in center of Inner Harbor, 4' waves

Gear Used: 66 pound Bruce on 260' of 3/8" chain with snubber made of ¾" mega-braid hooked on chain, fire hose as chafe gear. Anchored in 42'.

Problems: Dragged 50-100'; snubber parted at a non-chafe point about 4 hours into storm

Left on deck: Mainsail on, dodger up, dinghy upside down and deflated on deck

Actions taken: First half: Motored into 80 knots after snubber broke
Eye: Replaced snubber and reset anchor for expected new wind direction
Second half: Everything was okay

Overall feeling about ground tackle: Good, but will improve snubbers and tie them on with rolling hitches instead of hooking on

Other comments: Not sure if motoring helped or was better to keep constant tension on bow. It helped to have a strong dodger so we could be aware and see what was happening around us.

38' Ericson, 8½ tons, 2 people on board in middle of Inner Harbor, 4-5' waves

Gear Used: 44 pound Bruce on 225' of chain with snubber of 3-strand nylon hooked to chain and cleated on deck, hose tubing used as chafe gear. Danforth secondary anchor on 40' of chain and 110' of ¾" nylon rode, no snubber or chafe gear on it. Anchored in 45'.

Problems: Dragged 400' about 3 hours into storm, snubber chafed to 1 strand, MOB pole broke

Left on deck: Main sail, solar panels, kayak on deck, dinghy on davits, all MOB equipment, outboard on stern rail

Actions taken: First half: Dropped secondary anchor and tied anchor bends to chain on primary (stopped dragging)
Eye: Made 2 new snubbers, pulled up both anchors and anchored again in the middle
Second half: None taken

Overall feeling about ground tackle: Good.

Other comments: Last one I want to see (they had seen the eye of Hurricane Ignacio over La Paz less than a month earlier)

Baba 30, 7½ tons, 1 person aboard in the middle of the Inner Harbor

Gear Used: 44 pound Bruce on 360' rode (310' of 5/16" chain and 50' nylon rode) with 5/8" nylon snubber shackled to chain and heavy wall heater hose and "lots of duct tape" as chafe gear. Also used 33 pound Bruce on 30' of 5/16" chain and 270' of 5/8" nylon, same type of snubber and chafe gear. Anchored in 48'.

Problems: Some wear on chafe gear.

Left on deck: Dinghy deflated, bagged and well tied down on foredeck; fuel cans tied down. Outboard on stern pulpit. Dodger up.

Actions taken: First half: Set second anchor once wind direction established. Prepared third anchor in cockpit (22 pound Bruce).
Eye: Retrieved second anchor and prepared to reset after wind shift. Adjusted primary rode chafe gear.
Second half: None needed.

Overall feeling about ground tackle: Everything worked as expected.

Other comments:

1. I have 3-300' nylon rodes, all have thimbles on both ends. I used the 30' of chain on the stern rode plus 50' of line to extend the chain rode on my primary anchor. I then have the rest of the stern rode to extend the nylon rode on the bow or to use as another rode. By being able to use the stern rode to extend 2 others rodes give me adequate scope in deep water.
2. I wait until the wind is set in the direction I expect. I anchor by radar. I want to motor forward 300+'. I set the VRM on the radar 300' beyond a stationary target behind me. I then motor forward until the VRM is on that target. I then use the motor to keep the bow close to the wind and slowly come back on both anchors. This avoids the boat blowing back quickly and (1) not allowing the second anchor to set and/or (2) popping out the first anchor and shock-loading everything.
3. I've used 2 anchors quite a few times in high winds. Only once did I have a slight problem with fouling.
4. One thing that doesn't work well is 2 anchors in tandem on one rode. Unless the anchors are set by a diver the chances of them both setting when dropped is very questionable. If the first anchor drags, the second anchor will likely keep it from resetting.
5. Even with a snubber on, don't leave a chain rode on a windlss. Secure it to a Samson post or a cleat. Many stainless bow rollers have been ripped off bows or failed structurally. Don't trust them!

52' Custom Trawler, 40 tons, 2 people on board near the north window in the Inner Harbor, 2' waves

Gear Used: 110 pound pseudo-Bruce on 225' rode, ¾" line as snubbers through hawse hole in bow, 65 pound kellet. Anchored in 42'.

Problems: No real problems – small amount of stretch in bridle, slightly bent chain grabber

Left on deck: Dinghy and motor strapped on stern. Entire roof of aft room covered with solar panels (flat) and all kinds of stuff strapped down, all were OK.

Actions taken: First half: Sat tight
Eye: Checked dinghy, checked top deck
Second half: Watched it all go bye

Overall feeling about ground tackle: For this storm, all worked fine

Other comments: Heavy boat + big anchor + kellet + good location = just lucky, we guess

Hunter 33, 13 tons, 1 person on board in the SE center of the Inner Harbor, 4' waves

Gear Used: 33 pound Bruce on 260' feet of ¼" Hi-Tensile chain. Snubber of 3/8" 3-strand nylon with loop tied in one end with bowline, then attached luggage-tag style to chain, run under chain rode over bow roller and led to cleat on deck. No chafe gear on snubber. 30 pound kellet made from mushroom anchor with chain wrapped around it. Retrieval line out through bow chock, towel wrapped around line as chafe gear. Anchored in 46'.

Problems: Minor chafe on snubber line, faulty bolt in bow roller broke, shackle on kellet (not seized) unscrewed. Had rigged a second anchor and dangled it off the side of the cockpit (not on bottom) with 40' of chain out, trip line cleated in cockpit – fouled and chafed rode, retrieved with difficulty. Unattended boat to windward dragged to within 3 boat lengths.

Left on deck: Dodger, solar arch with 2 large panels, outboard, MOB eequipment, LifeSling, BBQ, 2 jerry cans, propne bottle. (NOTE: I didn't worry about windage aft if I didn't think the item could be hurt)

Actions taken: First half: Dodged boat that was dragging down on me. Rigged second anchor as stated above.
Eye: Retrieved second anchor with difficulty. Checked everything for chafe.
Second half: Not much.

Overall feeling about ground tackle: Learned some things, saw things that could have gotten me in trouble. Overall satisfied but there are things I'd do differently.

Other comments:

1. Snubbers should go through bow chocks.
2. Topped up diesel fuel tanks the day before storm.
3. Motored at beginning to avoid dragging boat nearby. It put a lot of slack in the rode and the bow would fall off with a sharp tug. Didn't like that. However, I did later keep the engine running in neutral several times in case it was needed and also to keep it warm and keep water out of the exhaust.
4. I'd use 2 snubbers instead of one.

5. I need to come up with a better way to rig the second anchor so that I can launch it from the cockpit.
6. I should have prepared a ditch bag with important papers, food, water, warm clothes in case I had to abandon the boat.
7. I forgot to put the computer in a safe place until part way through the storm – it got some spray on it from the companionway, but was okay.
8. Need to have fresh batteries in the handheld VHF and spare ones in a reachable place. Since I was single-handing, the radio gave me contact with other people. I couldn't go down below because I was watching the boat that was dragging towards me.

Tayana 37, 14 tons, 2 people on board in SE side of Inner Harbor, 4' waves

Gear Used: 44 pound Bruce on 290' of 5/16" hi-test chain, attached to Samson posts. Two snubbers from ½" 3-strand nylon, tied to chain with rolling hitches, led through port and starboard hawse holes to nearby deck cleats. Used double layer of reinforced hose as chafe gear. Secondary anchor was 45 pound Plow on 50' of 5/16" hi-test chain and 250' of 5/8" 3-strand nylon – rigged with anchor in water 40' (not on bottom) and rode led to cockpit winch so that anchor could be let out from cockpit in an emergency (anchor would not self-deploy from bow roller and we were afraid that we might not be able to get to the foredeck in an emergency). Anchored in 46'.

Problems: During the night before the storm, second anchor fouled the rode and snubbers on the primary anchor, and chain from secondary rode was chafing on snubbers. After storm, discovered hockling in snubber lines close to where rolling hitches were tied.

Left on deck: Spare propane canister, jerry jugs (tied down), MOB pole, LifeSling, life raft (in stainless steel bracket), outboard on stern rail, solar panels on dodger arch and on stainless "lifelines" (all in position so that only edge was facing forward)

Actions taken:

First half: Were working to untangle secondary anchor from primary when the storm hit. As it became obvious that we couldn't get the second anchor back on deck, lowered it approximately another 35' so that the rope portion of rode was against snubber lines (instead of chain chafing against snubbers). Anchor was on bottom but on very short scope (as far as we could tell, the rode to it never became taut). Repositioned chafe gear on rope rode to secondary anchor. Checked chafe gear every 30 minutes or less. Ran bilge pump periodically due to water coming in anchor hawse pipes even though they were covered.

Eye: Retrieved secondary anchor. Repositioned chafe gear.

Second half: Kept checking chafe gear and periodically running bilge pump.

Overall feeling about ground tackle: It held!

Other comments:

1. We have ordered a 66 pound Spade and 110' of 3-strand for additional rode. Plan to use Spade as our everyday anchor when it arrives. Bruce 44 will become secondary, and the 45 pound CQR will become third in line.
2. We used "storm snubbers" of new line. Line is long enough that we can cut used portion off and still have an unused section for next storm. Next time, we'll have 4 snubbers – our "everyday" snubbers will be in place for backup with no strain initially but already rigged in case one of the primary snubbers breaks.
3. We will replace the used snubber line at the first opportunity. After storm, used calipers and discovered that snubber line had stretched to the point where it was ⅛" less in diameter and looked "fuzzy" instead of smooth like the unused portion.
4. Snubbers are a critical part of the ground tackle to absorb the shock loads. They need to have a certain amount of stretch in them, so need to be "undersized" compared to the rest of the ground tackle.
5. Next time, will make a 25 – 30 pound kellet from our mushroom dinghy anchor and dive weights (tied on or attached with cable ties).
6. Our chafe gear worked really well – no sign of chafe at all. See Earl Hinz, *The Complete Book of Anchoring and Mooring* (rev. 2nd ed.), p. 288 for a complete description. We used two layers of reinforced water hose. It took about an hour to make each one of these though – a good thing to do prior to hurricane season. Very hard to shove one piece of hose inside another – the best way I found was to chill the smaller diameter piece, heat the larger-diameter piece in hot water, smear the smaller piece liberally with Liquid KY and use lots of force with a twisting motion. The two pieces should fit together *very* tightly. We also made spare pieces of split hose that could be placed over a line without uncleating it – had some pieces of both the smaller and larger diameter so we could still use a double layer.
7. Wetsuits worked very well for staying warm – we were cold with just our foul weather gear as rain was coming in through the neck.
8. A snorkel mask made it possible to look into the wind, rain and spray.
9. We took almost everything below decks and think this helped us. Some people left sails on the boom, but we stripped ours off. Also took the dinghy below, the BBQ grill off, took our bimini stainless off, etc. Also took down the genoa and then pulled all the line tight so that the drum couldn't spin in the high winds.
10. We are thinking about getting a small riding sail to use in storms to try to keep the bow from falling off so much, resulting in big shock loads on the ground tackle.
11. We need to figure out a better way to rig our second anchor for quick deployment in an emergency.
12. We thought that the eye was the end of the storm. We should have known better, it got "too good, too fast" as winds went from 80 knots to 10 knots in about a half hour.
13. We used a lot of Liquid Wrench to take things apart before the storm, and used Never-Seize liberally when putting things back together. Also used a lot of seizing wire when putting rigging items back together. Every time we prepared for a storm, we lost at least one shackle overboard.