SAFETY AT SEA

QUICK REFERENCE GUIDE

US Sailing — Safety at Sea Course — Notes by Jeremyn Horsley - Sure Shot Marine

1 | PERSONAL SAFETY

PFD Selection & Maintenance

- Offshore passages require a Type I or offshore-rated inflatable PFD — not a coastal foam vest.
- Inflatable PFDs must be inspected before every trip:
  - Check CO_2 cylinder: verify weight matches cartridge label, look for corrosion on threads
  - Check rearming kit: bobbin/pill must not be corroded or expired (typically 1–3 year service life)
  - Inspect bladder for cracks, pinholes, and oral inflation tube condition
  - Check harness webbing and buckles for wear, UV degradation, and proper function
- Auto-inflate models have a hydrostatic pill that dissolves on immersion — verify it isn't expired.
- Manual inflates require a conscious, functioning sailor — know which type you own.
- Crotch straps are essential: without them, a PFD can slip over the head upon inflation.

Tethers & Jacklines

- The rule: tether up before you come on deck in any conditions that could put you overboard.
- Jacklines should run fore-aft along the boat's centerline or sidedecks, not to stanchions.
- Tether length matters: a 6-foot tether can still put you in the water. Use short tether on a deck ring whenever possible.
- Double-ended tethers allow you to clip to a new point before unclipping from the old one — never be unclipped offshore.
- Inspect tether webbing and snap hooks for corrosion, stiffness, and gate function before each passage.

⚠ A sailor overboard at night in open ocean is essentially unrecoverable. Prevention — tethering — is the only reliable strategy.

Situational Awareness on Deck

- Three points of contact: always maintain two hands and one foot, or two feet and one hand.
- Move deliberately: hurrying on a moving deck causes falls. Take your time.
- Know where everyone on watch is at all times. Account for every crew member during any sail handling evolution.
- Night watch: allow 20+ minutes for dark adaptation before taking the helm. Use red light only below.

Man Overboard (MOB)

- Immediate actions: shout 'Man Overboard!', assign a pointer, press MOB on GPS, throw horseshoe buoy and light.
- The pointer never takes their eyes off the victim — not for any reason.
- Recovery methods:
  - Figure-8 / Quick-Stop: most reliable in open water, keeps victim close to the boat
  - Reach-tack-reach (beam reach, tack, close reach back): fast and simple for short-handed crews

- Practice MOB drills regularly — ideally with a fender/cushion as the 'victim' until the evolution is automatic.
- Hoisting a conscious swimmer back aboard is physically demanding. Have a plan: ladder, halyard, webbing strap.
- Hoisting an unconscious or hypothermic victim requires a sling or strop — deadweight is nearly impossible to lift otherwise.

2 | STABILITY & SEAMANSHIP

Understanding Boat Stability

- Stability is described by the righting moment curve: the force restoring the boat to upright at any given angle of heel.
- The angle of vanishing stability (AVS) is the point of no return — beyond this angle, the boat will capsize and may not self-right.
- Most bluewater cruisers have AVS of 120–130°. Lighter, beamier boats can have AVS as low as 90–100°.
- Know your boat's stability rating (ISO, US Sailing ORC category) and the sea states it's rated for.
- Loading matters: weight low and centered improves stability. Heavy items in cockpit lockers raise the center of gravity.

Reefing Strategy

- Reef early — when you first think about it, not after conditions have already deteriorated.
- A good rule: if you're asking 'should we reef?' the answer is almost always yes.
- Double-reefed main and staysail (or storm jib) is an excellent heavy-weather combination on most boats.
- Know how to deploy your storm sails before you need them. Rig them in harbor and practice at least once.
- Running downwind in survival conditions: trailing warps or deploying a sea anchor can slow the boat and reduce broaching risk.

Heavy Weather Sail Trim

- Flatten sails in breeze: ease the halyard, tighten the outhaul and backstay — reduces power and heeling moment.
- Ease traveler to leeward before easing the mainsheet: keeps the boom from rising and reduces heeling.
- An overpowered boat that broaches is more dangerous than a boat sailing slower under reduced canvas.
- In steep seas, apparent wind shifts dramatically on each wave face — anticipate, don't over-correct.

Watertight Integrity

- Before any heavy weather: close all through-hulls not in use, dog all hatches, insert companionway boards.
- A breaking wave into the cockpit can fill the boat if the companionway is open — this has sunk boats.
- Cockpit drains: confirm they are clear and adequate for your boat's cockpit volume. Many older boats drain too slowly.
- Seacocks: every through-hull below the waterline should have a functional seacock. Know where each one is.
- Softwood plugs: keep one wired to or adjacent to every seacock below the waterline. A failed through-hull can be plugged in seconds if the plug is at hand.

3 | WEATHER

Pre-Departure Forecast Routine

- Consult at least two sources: NOAA forecast and a model-based source (Passage Weather, PredictWind, Windy).
- Marine zone forecasts from NOAA are the official product — read the full text, not just the graphic.
- Look for the timing and track of any approaching fronts, not just the current conditions.
- Check offshore buoy reports (NDBC) for actual sea state and wind speed as a reality check against the forecast.

Reading Synoptic Charts

- Isobars: closely packed = strong pressure gradient = strong winds. The gradient direction determines wind direction.
- Cold fronts typically bring rapid wind shifts (counterclockwise to clockwise/veering in Northern Hemisphere), squalls, and seas that lag behind the wind change.
- Warm fronts bring gradual deterioration: increasing clouds, backing wind, persistent rain.
- High-pressure systems bring stable, clear conditions — but watch the gradient between a high and any nearby low.

Local Effects & Bay Area Specifics

- Thermal gradients between ocean and land drive afternoon sea breezes that can be far stronger than synoptic forecasts suggest.
- San Francisco Bay: forecast of 20–25 knots at the buoy often means 30–35 knots at the Golden Gate, with steep, short-period chop.
- Coastal fog formation is independent of wind — don't assume good visibility at departure means good visibility offshore.
- Diurnal patterns: wind typically builds midday to early afternoon and eases at night — plan departures accordingly.

Go / No-Go Decision

- Most offshore accidents involve a failure of the go/no-go decision — leaving in deteriorating conditions or ignoring forecast warnings.
- The boat's dock is always an option. Marinas are not emergencies. A late arrival is not an emergency.
- If crew is fatigued, seasick, or inexperienced, the safety margin for handling unexpected conditions is dramatically reduced.
- Always have a bail-out plan: a port of refuge you can reach if conditions exceed your expectations.

⚠ Weather window checklist: Stable or improving forecast for full passage duration? Sea state manageable? Crew rested? Bail-out port identified? If any answer is no — wait.

4 | COMMUNICATIONS & EMERGENCY

VHF Radio

- Channel 16 is the international distress and calling frequency — monitor it at all times underway.
- DSC (Digital Selective Calling) allows one-button distress alert with GPS position — requires MMSI number registration.
- Register your MMSI at no cost through BoatUS, Sea Tow, or FCC. An unregistered DSC distress call creates confusion for the Coast Guard.
- VHF range is line-of-sight: approximately 15–20 miles to a Coast Guard station, more to an aircraft.
- Carry a handheld VHF as backup — at minimum for MOB victim use in the grab bag.

Distress Calls

- MAYDAY — Immediate threat to life or vessel.
  - MAYDAY MAYDAY MAYDAY, This is [vessel name] [vessel name] [vessel name], MMSI [number]
  - Position: [lat/lon or bearing/distance from known point]
  - Nature of distress, number of people aboard, vessel description
- PAN-PAN — Urgent situation, not immediately life-threatening (e.g., medical issue, disabled vessel).
- SÉCURITÉ — Safety message (e.g., hazard to navigation, debris in channel).

EPIRB & PLB

- EPIRB (Emergency Position Indicating Radio Beacon): vessel-based, Category I auto-deploys on sinking, Category II requires manual activation.
- PLB (Personal Locator Beacon): personal device, registered to individual, must be manually activated.
- Both transmit on 406 MHz to COSPAS-SARSAT satellite system — rescue coordination is via NOAA and USCG.
- Register your EPIRB at beaconregistration.noaa.gov — include vessel description, contact numbers, and emergency contacts.
- Newer 406 MHz beacons with GPS embed position in the signal — SAR response time is dramatically faster than older beacons.
- Test annually per manufacturer instructions. Replace battery and hydrostatic release per service schedule.

Float Plan

- File a float plan with a responsible person ashore before every offshore passage.
- Include: departure port and time, destination, estimated arrival, vessel description and MMSI, number and names of crew, EPIRB registration number.
- Establish a check-in schedule and specify when to call the Coast Guard if not heard from.

5 | DAMAGE CONTROL

Flooding & Seacocks

- Identify and label every through-hull on your vessel before you leave the dock.
- Seacock exercise: turn every seacock monthly to prevent seizing. A seacock that hasn't moved in years may not close when you need it.
- Softwood plug kit: one plug per below-waterline fitting, tapered, lashed directly to the seacock or fitting.
- Bilge pump capacity: know your pump rate. Most manual bilge pumps move 10–20 gallons per minute. A 1-inch hole at the waterline can admit 65+ GPM. Bailing buys time — fix the problem.
- High-capacity electric bilge pump as backup; manual pump as primary (electric can fail when you need it most).

Collision & Hull Damage

- Collision mat or patch kit: keep underwater epoxy putty, underwater foam filler, and a wooden plug kit accessible.
- For a large hole, a sail stuffed from outside and held by water pressure can reduce flooding enough to allow pumping.
- Know your boat's watertight compartments, if any — some boats will float when swamped, others will not.

Fire

- Keep fire extinguishers fully charged and accessible (not buried behind gear). Inspect annually.
- Galley fires: maintain a lid or cookie sheet at the stove to smother a pot fire without water.
- Engine compartment: fixed CO_2 or dry chemical systems; know how to activate without opening the compartment.
- If fire is not contained within 30 seconds: prepare to abandon ship. Don't try to fight a boat fire alone with inadequate equipment.

Rigging Failure

- Carry basic tools to cut away failed standing rigging: bolt cutters or a dedicated rigging knife.
- If a mast goes overboard with rigging still attached, it can punch through the hull. Cut it away as quickly as safely possible.
- Spare parts: keep halyards, sheets, shackles, blocks, and spare wire aboard for jury-rigging.

6 | NAVIGATION & WATCH-KEEPING

COLREGS — Rules of the Road

- Rule 5 — Lookout: every vessel shall maintain a proper lookout by sight and hearing at all times.
- Rule 8 — Action to avoid collision: take early, substantial, positive action. Don't make tiny adjustments.
- Rule 16 — Give-way vessel: take early and substantial action to keep well clear.
- Rule 17 — Stand-on vessel: maintain course and speed — but take action if collision becomes inevitable.
- Power gives way to sail — with major exceptions: power vessel restricted by draft, fishing vessel with gear deployed, vessel not under command.
- In a narrow channel: keep to the starboard side. Sailing vessels do not have automatic right of way in a traffic separation scheme.

AIS & Radar

- AIS provides vessel ID, course, speed, and CPA (closest point of approach) for equipped vessels.
- AIS does not cover: fishing vessels under 65 feet, recreational vessels, vessels with transponders off, and vessels not required to carry AIS.
- Radar detects everything with sufficient radar cross-section — but small FRP dinghies and logs do not reflect well.
- CPA/TCPA: use radar and AIS to calculate closest point of approach and time to CPA. Take action early.
- Neither AIS nor radar replaces a proper visual watch.

Watch Schedules

- Fatigue is a primary factor in offshore accidents. Establish a watch schedule before departing.
- Common schedules: 4-on/4-off (works for 4 crew), 3-on/6-off with overlap (3 crew), buddy system or dog watches.
- Night watches require a fully rested person at the helm. Never allow a sole watch stander to fall asleep.
- Consider AIS alarm thresholds and radar watch alarms to supplement human watch — not replace it.

Navigation Fundamentals

- Dead reckoning: maintain a running plot of position based on last known fix, course, speed, and elapsed time.
- GPS is primary but not infallible — power failure, antenna damage, or spoofing can all affect it.
- Paper charts and handheld GPS or chartplotter as backup. Know how to take a fix from visual bearings.
- Passage planning: identify waypoints, hazards, clearing bearings, and port of refuge options before departure.

7 | ABANDON SHIP

⚠ **Stay with the boat as long as it is afloat. A floating vessel — even swamped — is far easier for SAR to find than people in the water.**

Grab Bag Contents

- EPIRB (or activate and stow in bag)
- Handheld VHF radio, fully charged, in waterproof bag
- Water: minimum 1 liter per person, more if possible
- Flares: SOLAS-grade parachute flares, handheld flares, and smoke signal
- Knife: serrated, easily accessible
- First aid kit: trauma dressings, seasickness medication, basic medications
- Ship's papers: documentation, insurance, registration, passports
- Cash and credit card
- Handheld GPS or compass, charts of the area
- Signaling mirror
- Waterproof flashlight and spare batteries
- High-calorie food: energy bars, emergency rations

Life Raft Deployment

- Hydrostatic release: most offshore life rafts have an HRU that automatically releases the canister at depth — verify yours is within service date.
- Deployment: throw the canister to leeward, then pull the painter until it goes taut and tug sharply to activate CO_2 inflation.
- Board the raft without entering the water if possible — step up from the boat.
- Cut the painter only after all crew are aboard and the mother vessel is clearly sinking.

In the Life Raft

- Activate EPIRB immediately and stow it in the raft so the antenna is upright.
- Deploy the sea anchor/drogue: reduces drift, stabilizes the raft, keeps it positioned near the last known location.
- Water discipline: no drinking for first 24 hours unless dehydration is already advanced. Ration strictly thereafter.
- Stay together: multiple rafts should be tethered together. Don't separate.
- Maintain morale and watch schedule: assign tasks, keep people occupied, watch for rescue craft continuously.
- Signal: use mirror, flares, and VHF at scheduled SAR broadcast times. Conserve flares for confirmed rescue vessel sightings.

Hypothermia in the Water

- Cold water incapacitation: in 50°F water, useful swimming time is 30–60 minutes before muscular incapacitation. Mental confusion can set in sooner.
- Heat Escape Lessening Posture (HELP): draw knees to chest, cross arms over chest — reduces heat loss by up to 50%.
- In a group: huddle together with sides touching, legs intertwined — conserves heat for all survivors.
- Do not attempt to swim to shore if the distance is uncertain — horizontal swimming accelerates heat loss.

8 | OFFSHORE FIRST AID

Seasickness

- Prevention is far easier than treatment: take medication before departure, not after symptoms begin.
- Options: scopolamine patch (most effective, 72-hour duration), meclizine, promethazine suppository if oral medication fails.
- Severely seasick crew are useless and potentially dangerous. Have a plan for shorthanded sailing if one or more crew are incapacitated.

Trauma Management

- Bleeding: direct pressure, sustained for a minimum of 10 minutes without lifting. Tourniquets for limb arterial bleeding.
- Head injury: assume cervical spine injury — minimize movement, monitor level of consciousness.
- Orthopedic: immobilize fractures in the position found. Improvised splints from dock lines and cushions.
- Wound closure at sea: steri-strips or wound stapler for clean lacerations. Avoid closure of dirty wounds.

Medical Evacuation

- USCG medevac via VHF Channel 16 — Pan-Pan if urgent, Mayday if life-threatening.
- AMVER (Automated Mutual Assistance Vessel Rescue): ships in the area can be diverted to assist — the Coast Guard coordinates this.
- Telemedical assistance: DAN (Divers Alert Network), USCG, and some commercial services provide physician consultation via SSB or satellite phone.

ALWAYS: File a float plan. Carry a charged EPIRB. Wear your tether offshore.