What We Can Learn from Sailing Accidents to Benefit Sailors

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What happened in 6 incidents? How they have changed sailing.
Lessons Learned Incorporated into:
- Equipment Requirements
- Training
- Vessel Limitations
- Crew Expertise
3 Incidents, 7 souls

• Low Speed Chase, Sydney 38
  • Safe Water Depths
  • April 14, 2012: 5 crew lost

• Imedi, TP 52
  • Boat Control near COB
  • July 21, 2018: 1 crew lost

• Morpheus, Moore 24
  • COB Recovery Equipment
  • March 13, 2019: 1 crew lost

• ALL: Inadequate Flotation
Farallones Race
San Francisco
April 14, 2012

A normal lively sailing day -

- turned tragic:
  Breaking wave
  Lee Shore
  5 of 8 crew lost
Failure of seamanship in negotiating shoal waters on a lee shore
Lost At Sea -

Alan Cahill  Alexis Busch  Marc Kasanin  Jordan Fromm  Elmer Morrissey

No tethers: 5 of 7 in the water were lost; one on boat survived.
Survivors wore life jackets that met US Sailing 5.0.1
Compromised buoyancy in surf/aerated water

US Sailing
12 days later: USCG Capt. Stowe called for Stand Down in Gulf of the Farallones

Restricts offshore races to line from Mt. Bonita to Land’s End

“San Francisco offshore sailboat racing organizations need to review racing safety protocols and seek improvement”
USCG asked US Sailing to Investigate:

1. **Failure of seamanship** in negotiating shoal waters on a lee shore was the only direct cause

2. **Inadequate personal safety gear** in use for offshore conditions, could have saved lives

3. **Limited VHF communication infrastructure** hampering race committee-to-race boat communications

4. **Race management protocol flaws** created uncertainty surrounding search and rescue efforts
Only Prevention: more conservative course
Recommendations from LSC Tragedy

1. Annual Training to improve seamanship, specifically on breaking wave development.

2. Require personal flotation to meet USS prescription 5.0.1, training in jackline rigging and use, spot inspections to ensure MER compliance.

3. Improve VHF communication infrastructure

4. Improve race management accountability of boats and crew on the race course.
Safe Water Depths:

Significant Wave Height/SWH = average of largest 1/3 of all waves.

Forecast: wind waves 7’ on 15’ swell

Maximum: 30 feet, 2-3 per hour = 25’

Calculate minimum depth from maximum forecast swell and wind-wave heights: 3 ways

Easiest: 2.5x the sum of maximum forecast swell and wind-wave heights

For April 14th forecast: 1) 43’, 2) 55’, and 3) 45-60’
Inadequate personal safety gear for offshore conditions

• Racers required to “have” lifejackets to meet US SAILING 5.0.1, but only wear “adequate” flotation

• Category 2 requirements not met by two crew

• Of crew in water, those wearing 5.0.1 life jackets survived, none had thigh straps

• Jacklines deployed per requirement, not used
Direct Results – NorCal ORC

• Seamanship – Skippers’ meetings: local conditions

• More variety of Safety at Sea course formats: ½ day, full day, 2 day

• Safety gear – SERs created, consistent among all OAs, inspections required
Wide open cockpit: no jack lines near vang control
Imedi recovery attempts
Jon Santarelli was fit, conscious, swimming. Why did he drown?

Life Jacket Maintenance & Understanding:
• Cursory pre-inspection of 10+ year old life jackets
• Crew not familiar with boat-supplied life jackets
• No attempt by PIW to manually/orally inflate life jacket

CO2 cartridge not pierced until recovered 1 week later
Other Issues:

2. Obligatory COB Practice:
   inside breakwater, under power

3. Command Structure:
   poorly defined

4. Unused Equipment:
   LifeSling, MOM
Lessons Learned

1. Comprehensive Dock Talk: command structure, crew roles, procedures
2. Establish/communicate COB procedures
3. Safety gear: Inspect, fit, instruct prior to use
4. Practice in expected conditions
5. As PIW: act immediately
6. Enhanced training needed for inflatable lifejackets
Safe COB Recovery in seaway:

Alternative Possibilities:

• Swimmer of the watch (Professional crews)
• Lower crew on halyard (Adequately fit crew)
• Modified LifeSling 1:2 retrieval

Flat bottom, fin keel
Safe COB Recovery in Seaway:

1. Push MOB button
2. Slow boat, Lower headsail
3. Sail by COB – Ensure adequate flotation, don’t stop
4. Dowse main, motor back
5. Drag LifeSling around COB
6. Stop boat, drift
7. Hook spinnaker halyard to tow line outside lifelines, do not disconnect.
8. Hoist COB on 1:2 purchase up and over lifelines
Morpheus, Moore 24
Monterey Bay Wednesday Evening Race, March 13, 2019 – COB drowned

Windy conditions, but not unusual for Monterey Bay
Recovery Attempts, Morpheus crew:

Figure 8, twice. Lost grip: “Hurry”
Threw line, upwind, Dale falls in
GPS Track and Notes of Loca Motion 3/13/19

Location where we were hailed by Morpheus about additional person in water and turned back to search 6:26:09 PM

Location where we first saw Morpheus dragging crew in life ring and we stopped and dropped jib and started engine. 6:24:11 PM

1000 feet

Location where we recovered our 2nd crew member alfredo 6:33:54 PM

Mile Buoy
Lessons Learned

Stay attached to boat
Consider use of lifelines
Cause of death: drowning due to inadequate flotation
Use of Lifesling could have provided flotation
Crisis stress > additional people in water
Cold water acts quickly
Inflatable Lifejackets

Still the best option

Integrate harness, tether

Must be understood, maintained, checked

Must be adjusted to fit

US Sailing to survey inflatable lifejacket failures

New clinics specific to life jacket wear & care
It’s not just sailboats or recreational boaters...

“human errors on a multitude of levels as the root cause of the accident”
“the watch officer onboard the Tunisian ro-ro Ulysse was alone on the bridge and was on his phone”
Vestas Wind
Volvo Ocean Race
November 29, 2014
Volvo Ocean Race 2014-2015

10 Leg, 39,000 mile race

8 crew plus a media professional

65’ one-design boats

Hazardous courses
25 degree angle of heel, lots of sails, small radar, constant sail trimming...
New Route for 2013-2014 Race
How could you determine if there might be land there?
Big blue area showing depths less than 200m
Territorial sea boundaries
Chart “bounds”
A name of a physical feature with “shoal” in it
Lessons Learned:

• Exclusion zone changed ~ 36h before race start
• Navigator and skipper did not zoom in on C-Map charts; were completely unaware of the danger
• Conditions they encountered matched what they had imagined and warned the crew about
• Did not use radar or depth sounder because there was no perceived need.
• C-Map charts were not effective at alerting the crew to the danger of the reef
The Loss of Clipper Ventures 24

Information and Images from MAIB Accident Report

“Report on the investigation of the grounding and loss of the UK registered yacht CV24 at Cape Peninsula, South Africa, on 31 October, 2017
Report on the investigation of the grounding and loss of the UK registered yacht CV24 at Cape Peninsula, South Africa, on 31 October 2017.
Clipper Round the World Race

- Pay-to-sail race around the world on 12 identical 70 foot sloops
- One professional captain on each yacht
- Extensive training program prior to the event
- Sailors can sign up for one or more legs or the entire race
- Course is similar to Volvo Ocean Race with about 12 legs; passes through Panama Canal
The Race Course
Previous Incidents

Groundings

Loss of CV4, Indonesia, 1/2010
Crew overboard, successful, 3/2014
Gybe causing trauma, fatal, 2015
Crew overboard fatal, 11/2017
Crew overboard, fatal, 12/2017

Mandatory reporting to Head of Training

Successful MOB recovery
Crash or accidental gybes
25 months: 107 reported incidents
Aground in Brazil during 2015-2016 Race
Timeline

23:43 UTC  Man Overboard, initiated MOB procedure
00:55 UTC  Crewmember sighted
01:13 UTC  Crewmember recovered

90 minutes in the water.
Crew made full recovery.
Path of CV24 from the start of Leg 3, along Cape Peninsula

Winds initially out of the NE; began to back as fleet went south.

Breeze freshened from the north, then NNW
Paths of vessels along Cape Peninsula
Lessons Learned

1. Loss of situational awareness was the proximate cause of the grounding, i.e. navigation was ignored so that the gybe could be safely carried out.

2. A lack of a passage plan made it more difficult to determine that the vessel was off-course.

3. Navigational training was not part of their comprehensive training program.

4. Key navigational information was either not displayed or not available on deck.
2017-2018 Volvo Ocean Race
Collision on Leg 4

Fleet was headed from Melbourne to Hong Kong

TWA of 150, 21kts of boat speed

Encountered a mass of coastal fishing boats

Collision between V11 and one of the boats on her port bow about 30 miles from the finish

The captain of the fishing boat was killed in the collision

Vestas 11th Hour Racing stayed on site and helped rescue the fishermen after the collision
Philippines to Port
Trends in Long Distance Offshore Racing

Boats are faster with fewer sailors

Routes cross the equator more frequently

Fleets sail in congested waters: Qingdao, Hong Kong, Gibraltar, Brazil, Strait of Malacca

Sponsorship drives the route choices
Fishing Vessel Activity by AIS, Sept 2017
Fishing activity near Qingdao (beige boats are fishing vessels)
Heel + spray + jibs on the water = tough watchkeeping.

Photo credit: Ainhoa Sanchez, Volvo Ocean Race
Risk Factors

1. Limited visibility from the sailboat
2. Limited visibility of the sailboat from surrounding vessels
3. Local fleets unaware of the vessels’ arrival or speed
4. AIS in near universal use, but may be on nets or skiffs
5. Fishing vessels are lit, but not with IRPCAS lights
Dipping the Bow

Helmsmen would bear off 10-20 degrees periodically to allow them to see beyond/behind the luff of the headsail.
Crew to Leeward

Watch captains position a grinder or an extra crewmember to leeward to wait for an opportunity to view what is under the sail.
Timing is everything

Crews to leeward in the cockpit would have to wait for the sailboat to be on a crest to get the best view.
Crews indicated that the A3 and MHO, due to their overlap, presented the greatest visibility issues. Shorter LP sails, like the FRO, were easier to see around.
Navigation light conundrum

Up to 20m, vessels can use a combined nav light at the masthead for sailing

Above 20m, separate sidelights and a sternlight

Cannot be used under power, necessitating additional lights

Lights at the sheerline are blocked by sails

Lights on the prod are frequently underwater
VO 65 solution

Three LED modules, mounted to the carbon wind sensor mast

Not blocked by anything but the Windex and VHF antenna
Making the sailboats easier to see

Both deck-levels lights and masthead lights have advantages

1. Use both, especially in harbors or areas that are backlit by city lights
2. Add a blinking light to the tricolor light to bring attention to it
3. Illuminate the head of the mainsail with uplights on the uppermost spreader, without blinding the crew or skipper
Current “tricolor” light
Current “tricolor” light with “uplight”
Prod-mounted and “tricolor” lights
Sheerline and “tricolor” lights
Blinking and “tricolor” lights
Actions Taken

Extensive investigation into causes of the collision.
VO65s fitted with much better radar for anti-collision.
Better AIS antenna installations.
World Sailing letter to IMO explaining the problem and requesting clarification of COLREGS.
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