

A Study Evaluating MOB Return and Recovery in the 21st Century – Preliminary Findings

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Richard W. York, Editor

This report is primarily based on the study of over 22 incidents of sailors over the side by a peer group of twelve CCA USS, NYYC and STC experts, secondarily including reviews of over 50 other Man Overboard incidents, and with other information as needed for better understanding. It is the first rigorous look at our training on MOB return and recovery since the 1980s. Since that time we have incorporated the Lifesling® and AIS transmitters on the MOB. But an overall look in 2020 is warranted.

The purposes of this study include:

1. Are there changes to be made in the training we give to sailors at Safety at Sea courses and in the online and printed courses produced by US Sailing, in the light of changes made in boats and MOB gear in recent years?
2. Are there new techniques developed at the grass-roots level, typically by professional sailors, we should incorporate into our MOB procedures we train at Safety at Sea courses?
3. Are there changes in the way we train (e.g. only once every five years) that come from the group of experts who reviewed these cases?

The study broke the MOB Return and Recovery process into separate steps, similar to the steps we use in training.

1. Call “Man Overboard”, Launch Flotation, Assign a Spotter, Stop the Boat, push MOB button.
2. All hands on deck, start engine, clean up boat to prepare for return, determine return range and bearing to MOB spot or AIS blip if no visual contact. Stay Close. Finish by jibing or otherwise maneuvering toward MOB.
3. Maneuver back to MOB, proceeding slowly when near.
4. Establish a connection with MOB via a trailed Lifesling, a thrown rope or Lifesling, or direct grab. On biggest boats, send trained swimmer to MOB. Pull MOB to boat.
5. Recover MOB onto boat via Lifesling, grabbing, or other halyard system.

Each step, as well as the overall return and recovery, was dissected by our peer panel.

Conclusions are given in the remainder of this note.

Below are some critical findings:

1. Drowning is fast in real-life situations. While we have practiced MOB recoveries with people in the water, they all have flotation and prevention against hypothermia. In real-life situations, with wave action, cold-water shock and possible trauma to MOBs, the time to drowning is horribly short. For a person without flotation, drowning in four minutes is observed; six to eight minutes is frequent. In any seas with breaking waves, even people with flotation drown faster than we anticipate. (Note: in two cases of 11, the person probably died

of cardiac arrest or drowned after being stunned when going over. Also in these cases, death was in a short time.

While this may not be new to us intellectually, we need to put these issues into practice.

Recommendation I

While we preach wearing life vests, our training must be reviewed to emphasize:

- a. Dropping floatation immediately via a MOM8 or similar, plus tossing lots of other floatation handy to the MOB, both to help him/her and to mark the spot.
- b. Training the MOB to manually inflate his/her life vest; failures to inflate have killed.
- c. Training the MOB to look for other floatation, especially MOM8 or similar which have pylons.

2. In too many cases there was a **failure to make a safe connection with the MOB once back** to him/her. In five of eight cases where the boat returned to the MOB, but the person died, the boat took multiple passes to connect with the MOB. Not only did this eat up valuable time (in several cases the MOB was observed alive during the first pass), but the boat hit the MOB in several cases as the helmsman was trying to get close. Being hit by the boat is considered to be a contributor to the cause of death.

In the 21st century, more of our boats have plumb bows, long waterlines, flat underbodies, with thin foils below the waterline. They are much harder to control at low speeds, and the bows tend to be pushed around by waves and wind.

Clearly, the need is to make contact with the MOB without coming so close we endanger him/her with the hull. Professionals in large boats (e.g. Comanche as reported by Stan Honey), have used trained swimmers, sent out on a line to make contact with the MOB.

The Lifesling trailed for a water-skier pickup is a better way of establishing contact with a reasonably uninjured MOB for smaller or amateur-crewed boats. In examining the fatalities, about half *may* have had a better outcome had a Lifesling been used for contact.

Even coming nearby an MOB and establishing contact via a Lifesling or throw rope may have had better outcomes versus trying to bring the MOB alongside.

Recommendation II

Revise our training to emphasize using the trailed or thrown Lifesling or throw rope to establish contact away from the boat and to reiterate the dangers of hitting the MOB with the boat. Lifeslings and throw ropes may not be appropriate in as many cases on boats over 72 feet or professional boats, where a trained rescue swimmer may be needed and aboard.

Pulling a person out of the water once s/he is near the boat, in contact by hand or via a Lifesling or throw rope may also put the person in danger of being hurt by a hull. Rich DuMoulin is currently leading an effort to codify and experiment with a halyard-to-contact-line system (“midline”) which minimizes MOB-hull contact.

Recommendation III

Results of duMoulin’s work should be incorporated in our training as proven out.

3. In many of our cases, it was apparent the crew aboard were **unable to properly maneuver the boat back to the MOB** (sometimes the owner/driver fell overboard). Even when the boat was driven by an experienced helmsman, boats with **no or weakly-practiced MOB drills** meant there were issues in sail-handling or in evolutions, resulting in problems being able to maneuver the boat back to MOB. As we have always reiterated in Safety at Sea courses, it is important that crews practice on their own boats, in various conditions. Nonetheless, practice training is too weak. Boats should practice MOB recovery drills in heavier as well as light conditions and also at night if they will race overnight. Practice should include at least half of every watch at the helm, as the normal driver may not be available. Enforcing this is difficult, but is best done by Organizing Authorities of major races.

Recommendation IV. US Sailing should develop a standard training checklist for MOB Prevention and Recovery training (along with a few OAs), so OAs can require self-certification on major races (e.g. Newport-Bermuda, Transpac, Chicago-Mac).

4. The key concept of **staying close to the MOB** was reiterated in this study. It is still a watchword to more successful MOB recoveries. Keep the boat as close to the MOB as possible. The basic quick-stop was developed on this basis. The data shows that recovery of MOB when you do not slow the boat’s initial velocity away from the MOB means less chance of success. Systems not using the quick stop or similar have poorer results. Obviously, with the more modern, faster boats we have now, the nature of “close” may be farther than in the 1980s, when “quick-stop” was conceived. But the concept holds.

Recommendation V

Continue to teach the need to keep as close to the MOB by whichever means are possible within the envelope of the safety of the boat. This means, in the majority of the cases, quick-stop with the Lifesling.

There has been much discussion on the stress on the mast from “quick-stop” maneuvers. These include tacking quickly with the jib aback when sailing upwind, luffing to close-hauled when carrying a spinnaker, in order to drop it on the side-deck, and luffing up when running with a poled-out jib. Clearly, there are different results.

- Tacking with a jib up from close-hauled or a close or beam reach, onto a backed-jib, slightly hove-to position. The major forces on the mast are never more than sailing upwind or being knocked down flat. Any mast in proper care should be able to take such a tack.

Would a large, overlapping sail harm a weather spreader, endangering the mast?

Unlikely, but we might ask a sailmaker or mast engineer.

- Luffing up with a polled-out jib when running. As the forces in this case are not as great as when beating, it is unlikely to endanger the mast. Note that the forces on the pole can be very large, and must be respected.
- Luffing up with a spinnaker when running.
 - Most boats would have no problem luffing with a spinnaker in 15 knots.
 - Many have said they could not luff a boat running in offshore winds of 25 or more. That quickly letter-boxing the spinnaker is the best way of staying in control.
 - OAXACA, a Santa Cruz 50, was running at 16-22 knots in winds of 25, gusting 30 when they lost a person over the side, fortunately holding on to the spinnaker sheet. They luffed hard (maybe not quite to close-hauled), and recovered the chute to the foredeck. They had high quality crew aboard.
 - Howard Chesley reports sailing on an Olson 30 in 20+ knots, surfing at 10-14 and spinning to plaster the chute against the mast to stop as close to an MOB as he could.

We cannot easily determine cutoff limits for when to luff and put the spinnaker on the deck versus a drop in the lee of the main (without destructive testing). That must be left up to the discretion of the person in charge of the deck at the time.

For most of the audiences at Safety at Sea seminars, discussing both systems should suffice.

5. In only two of the cases was an **MOB-worn AIS unit** the tool used to guide the return to the MOB. But, the study found that AIS would be effective in almost every case, as even on high-speed boats, the boats stayed within a two-mile limit, the assumed radius of a sea-level AIS transmitter in seas. There is no doubt that AIS is an important new tool in returning to an MOB.

There are a number of issues with AIS units, now that they have been put into practical use for some time.

- Inflatable life vest mounted AIS units are not easy to install in such a way that they go off automatically, and John Harries reported on Attainable Adventure that AIS units in his life vests had worked free in such a way that they would not be “automatic” when the vest inflated.

- Stan Honey reports that professional sailors take their AIS units in their pockets when on deck without an inflatable vest. Should we be carrying them outside our vests? This requires we all learn how to keep them safely protected but also how to turn them on.
- In one case the boat's VHF masthead antenna was inoperable, so no AIS signal could have been received. In some races a backup antenna at deck level would have been required in this event.
- In one case that ended happily, the MOB took one hour to realize his AIS unit was not turned on. Once he did so, the boat was able to stop a search and return to him in minutes.

Recommendation VI

Convene a small group to focus on the use of AIS-for-MOB devices. They must come up with hard recommendations on wearing the device full time vs just inside an inflatable vest (on those boats where the vest is not required full time). Also, they must come up with practical methods of protecting the device and assuring that all crew know how to set it off.

6. A subset of our cases involved **smaller boats**, 22 and 24 feet without lifelines, Lifeslings or MOM8s. In both cases of fatalities, the MOB was alive (in one case) and most likely alive (in the second) when initially in the water. The biggest issue was **recovering the person out of the water**. In one case the MOB was very corpulent, and just man-handling him was impossible. This was reiterated in a third case (not peer-reviewed) involving a Cal 20 on the Columbia River.

Recommendation VII. US Sailing should charge the Offshore and Keelboat groups to work together to come up with solutions to recovering the MOB issue.

7. In several cases, the **MOB took action which markedly helped his/her recovery**. While we teach people in the pool how to take care of themselves and prevent hypothermia, we should also emphasize:

- Your whistle may be your best friend for being found in the dark. Know where it is and use it frequently if in the water without a boat coming right for you.
- Water lights are not 100%. Carry and use a personal strobe light.
- Know how to turn on your AIS unit. Assure it is on.
- Know how to use your spray hood. Much of the time, the MOB is over the side in waves.

Recommendation VIII Assure these points are included in pool time training.

8. **Night** means it is much harder to find someone, by simple count of incidents in this non-random study, as well as by logic. Nonetheless, there were some interesting learnings.

- The flotation dispersed should have lights on them. While MOM8s have lights, secondary markers would be helpful. Several boats had lights on their horseshoe rings. One boat had floating, waterproof flashlights in the cockpits they tossed near the MOB.
- Several bright lights from the boat are useful for picking out an MOB at night. Even if s/he is flashing a strobe, a constant light gives much better depth perception.
- As whistles have been proven effective; if you think you hear a whistle, pause the engine and listen.
- Lifeslings too should have a light on the sling. These have been in the SERs, but are not part of the basic Lifesling, and may be overlooked by coastal racers and offshore cruisers.
- Of course, the most important task is to practice MOB recoveries at night too.

Recommendation IX. Include these night-time aids in our training and safety requirements.

9. In two cases the crew was lost when **still attached to the boat by a tether** (in one case the clip broke before the person was recovered).

Several important points come out, which should be part of our training.

- When doing sail changes or other evolutions, always have people spotted at all times, especially at night. A person can go over the side and not be noticed for a few moments – enough time to ingest a lot of water if pulled alongside the boat.
- Train the helmsman to tack the boat - to lift the person on the high side and to slow the boat to as close to zero as possible.
- The Clipper race took specific action on this issue after losing one sailor. They have determined the best way to pull the MOB back aboard is to put a halyard on the still-connected tether and grind the halyard up. If the person went under the lifelines, connect the halyard outside the lifelines. While the leverage of this may not be the best, it is much quicker and simpler than trying to get a halyard to a crew's harness rings.
- The MOB will naturally try to stay with the boat, and that means holding onto the tether or another line. But if the MOB feels like s/he is drowning, s/he must have the option to quickly separate from the boat. In the case of LION, the victim did not have that option. All tethers should have a quick-release shackle at the harness end of the tether. While our SERs call for tethers that have “a means to quickly disconnect the tether at the chest end”, some interpret that as a knife blade. We should be specific as to a quick release shackle.

Recommendation X: Incorporate “MOB still attached to the boat” as part of our MOB training. Change our SERs to be specific as to a quick release shackle.

10. While not specifically within this study, there are several **MOB Prevention** topics that came to the fore.

- (Obviously) not one of the MOBs in this study was clipped on at the time of their slip overboard. Clipping on *all the time* is still the best MOB recovery.

- Over 60% of the MOBs were in the cockpit, not the deck, at the time they went over. The ratio was 80% for MOBs who were lost. Clipping on means clipping on everywhere, not just on deck.
- Sailors need to learn safer ways to do evolutions. This is as important for racers as cruisers. In at least one case, the MOB was lost off the foredeck while working there when the wind was increasing above 30 knots and the boat was heeled well in excess of 20°. The situation was such that the helmsman could have run off for a few minutes to flatten the deck, with no loss in position.

Recommendation XI

Include much stronger training in MOB Prevention throughout our Safety at Sea curriculum, including how to conduct evolutions such that the crew is safer on deck.

11. Ted Parish and others have discussed how we get **more safety training time for sailors**. He has suggested changing from just an every-five-years training cycle to something more like “continuing education” where every year or two a sailor needs to attend a shorter course, maybe on one or two new topics, to maintain certification.

As an example, the Storm Trysail Safety at Sea has a “level 200” program with advanced training and no certification. Despite the absence of reward, each year 30 to 40 sailors show up just to learn more. This program is successful in part because there is so much more to learn than sailors can get in one hands-on day plus the US Sailing online chapters.

A level-200 type course, perhaps less than a full day, could be required for sailors every two years to keep their US Sailing certification. It would require CCA, NYYC, STC and other clubs to step up to present the programs.

Recommendation XII Explore the feasibility of continuing education requirements, and clubs’ willingness to execute them.

Further exploration. There are still some issues discussed, and ideas to test. Some involve techniques and some involve product improvements. Below is a list of issues (sorted randomly) where further work may be warranted:

1. Using the Lifesling in a water-skier pickup in large waves. Some are unsure if the Lifesling would be difficult to use in waves. We just need to go out when times are nasty and try it.
2. An open question remains as to picking up a severely injured or unconscious person without putting a second crew in the water off a halyard. We need to devise hooks? Or other devices to do this easily so the second crew does not have to get too wet.
3. We need to see if we could devise a life vest with a loop high on the vest with which to attach a halyard or other device. Right now most hoists on a halyard would have to come from the chest loop(s) on the vest, a difficult place to reach by a crew or even by the MOB. A loop much higher would aid recoveries significantly.

4. Is there a better means of getting a line (with or without a sling) to an MOB without the boat having to be within throwing distance or maneuvering around with a trailing Lifesling? While we may be dropping Lifeslings by drone in 50 years, is there a better throwing or launching device we could develop now?

Minor changes to MOB Return and Recovery training should also include:

1. Many of the boats successfully returning to MOBs used their engines. Modern boats have much more powerful and effective engines than in the 1980s. Subject to the warning of not having lines overside to foul the prop, we should increase the emphasis on using engines to return from downwind.
2. Conversely, many modern boats have saildrive units, and in many cases these are placed farther away from the rudder than traditional shaft-drive propellers. The saildrive units have less ability to fine-tune boat positioning as there is less prop wash across the rudder. This contributes to poor handling characteristics mentioned in Findings 2. When training on the use of the engine, we need to emphasize the issue of not being able to place the boat alongside well.
3. While we emphasize coming to the MOB slowly, the lesson of not sailing by the MOB must be reiterated. In too many cases (without using a Lifesling), the boat was going just too fast to establish contact by throwing a line or hand-grabbing the MOB.

This study could not have been accomplished without the following sailors who lent their expertise in evaluating incidents and also giving general comments of great value. If these people had not cared, we could not have learned what we did.

Ralph Naranjo, my original partner-in-crime on this project.

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Chuck Hawley

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Mark Roye

Sally Honey

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Ted Parish

Stan Honey

Thank You All..... Dick York