# A REVIEW OF SOME RECENT ADVANCES IN MAN – OVERBOARD RECOVERY

## USYRU (Predecessor to US SAILING)
## Recent Progress in Man-Overboard Recovery


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## INTRODUCTION

A few years ago, several groups of sailors began to be concerned about the problems of man-overboard recovery, and two of these groups have done major experimental work. The tests of these groups have done major experimental work. The tests that have been conducted, some 600 in all, (about half with live "victims" in the water), represent an important body of knowledge in the areas of overboard procedures, tactics and equipment. This paper provides a brief review of the results and findings from this work, so as to make them readily available for study.

The Sailing Foundation, (SF), of Seattle, WA, began, in 1980, an effort to develop a more satisfactory method of overboard recovery. They were motivated by some accidents in their area in which one member of a two-person crew fell overboard and was lost. Later, the USYRU Safety-At-Sea Committee resolved to make man-overboard a research objective, after an incident in Narragansett Bay, in which one member of a two-person racing crew fell overboard from a small cruiser-racer, and nearly was lost. The Cruising Club of America's Technical Committee likewise resolved to study the problem; and the Naval Academy Sailing Squadron (NASS) decided to investigate overboard procedures to satisfy themselves that their standard operating practices were optimum or, if not, to rework them.

Because the organizations have many common members, a considerable interchange of results and ideas began to operate. There was no formally integrated activity nor any "project plan" or organization. Nonetheless, the results have fallen into quite a consistent pattern which has two noteworthy features: (1) novelty as compared with traditional overboard strategies; and (2) the sheer size of the body of experimental results supporting the ideas and conclusions that have emerged.

With permission of SF and NASS, we offer here a general description of their experimental work and of the nature of the new procedures that have been brought to operational status by these organizations. Between them, they cover the spectrum from shorthanded situations to full racing crews – the SF having begun with the idea of developing an all-purpose recovery method, with emphasis on solving the evident problems of shorthanded recovery; and the NASS being more interested in the best way to operate with a full crew. While procedures vary depending on the crew situation (mainly as to methods of bringing the victim aboard), the two mesh together remarkably well.

In the beginning, there was no assurance that a large body of actual test data would emerge, but it has done so. The main new developments have been the evolution of the boat-handling tactic called "quick-stop", which all concerned consider to be optimal; and the varying ways of getting the victim aboard, including the novel "Lifesling" apparatus and procedure developed by the SF. We first describe all these and then go on to a discussion of the possible impact on the equipment that is required to be carried by the ORC regulations.

## THE "QUICK – STOP" MANEUVER

The maneuver called "quick-stop" is a vital part of both the NASS and the SF overboard drills. First it is necessary to understand just what is meant by this term; and to describe how the maneuver is performed.

We use the terms "quick-stop" and "conventional" to describe differing ways of maneuvering the boat after someone goes overboard. In this discussion, these terms have the following meanings: "Quick-stop is a procedure in which boat speed is reduced at once by turning in a direction to windward and thereafter maneuvering at modest speed, remaining near the victim. "Conventional" here refers to procedures that do not do this – mainly the classic one of reaching off, either jibing or tacking, and returning on reciprocal course; also the "jibe-at-once" tactic, and in general, any procedure other than heading up at once. In short, the hallmark of the quick-stop is to reduce boat speed immediately by reducing the driving force from the sails, thereby making the boat stay closer to the victim and maintaining superior visibility.

Obviously, remaining near the victim is highly desirable, but the question that comes at once to mind is whether it is in fact possible to perform a "quick-stop" without undue risk of foul-ups that could defeat its aim, or, worse, jeopardize the recovery. These concerns were shared by both the SF and NASS, and each made enough trials to become convinced that the quick-stop maneuver was superior.

## A. Data on Quick-stop Trials:

The experimental data that bear most directly on the point in question is that obtained by the NASS. This is because NASS, interested mainly in fully crewed operations, were not so much concerned with the problem of getting the victim aboard, and therefore concentrated on return-to-alongside; and made many trials to study this operation. The SF operates a different recovery system in which the quick-stop element is not readily separable from the rest, being involved with the deployment and use of the special recovery gear (see below). Moreover, the SF trials were basically quick-stop in nature, thus do not yield comparative data.

The tests by NASS were made in the normal course of the sail-training programs and the voyages made by the 40' to 50' boats at the Academy. The crews were those that happened to be sailing at the time, and their individual skills ranged from reasonably expert to quite green. The crews were told that a test would be made during the voyage, but not when. If the test came during training, they were told whether the maneuver would be quick-stop or conventional; while if on passages, the choice was the skipper's to make.

A test would be initiated without warning by the individual aboard who was acting as coach. In the early tests, he would toss overboard the target object (usually a PFD bundled up), and start the stopwatch, not shouting anything or otherwise notifying the crew; however, it soon became apparent that in overboard situations it might be desirable to provide immediate flotation instead of, or in addition to, the standard MOB gear, and so the procedure was altered so that the coach would simply tell the helmsman that a drill was starting, and start the watch at that time – leaving the helmsman to throw the PFD. This permitted the timing of both the launching of the regular MOB gear as well as that of the PFD.

The program of tests was taken seriously. One can get a feeling for this by noting such instances as the case of the man who came storming up the companionway when he heard the noise about overboard, and went overboard himself; and the one whose zeal to get the pole overboard caused him to rip off a radio antenna whip and launch it.

Data were recorded on standardized sheets, and from these records the tables that follow were constructed. Table 1 gives the data on the estimated maximum separation between "victim" and boat, while Table 2 gives elapsed time from the beginning to a position alongside the victim. The data are plotted in histogram form, one set for each range of wind speed, and at the bottom the totals are summarized. Data on the time required to launch the MOB gear are presented in a later section.

**TABLE 1**
**NASS DATA SHOWING MAXIMUM SEPARATION FROM VICTIM IN TESTS USING QUICK-STOP VERSUS OTHER METHODS**

(In table, each letter X denotes one test)

| MAXIMUM SEPARATION (IN YARDS) | CONVENTIONAL MANEUVERS | QUICK-STOP MANEUVER |
|---|---|---|
| **(IN WINDS 0 TO 5 KNOTS)** | | |
| 0-50 | | XXXXXXXX |
| 50-100 | XXX | |
| **(IN WINDS 6 TO 10 KNOTS)** | | |
| 0-50 | X | XXXXXXXXXXXXX XXXXXXX |
| 50-100 | XX | XXXX |
| 100-150 | | |
| 150-200 | X | X |
| 200-250 | | |
| 250-300 | XX | |
| **(IN WINDS 11 TO 15 KNOTS)** | | |
| 0-50 | XXXX | XXXXXXXXXXXXX XXXXXXXXXXXXX |
| 50-100 | XXXXXXXXXXXXX | XXXXXX |
| 100-150 | XXX | XXXX |
| 150-200 | XXXXXXX | XXX |
| 200-250 | XX | X |
| 250-300 | XX | |
| 300-350 | | |
| 350-400 | X | |
| **(IN WINDS 16 TO 20 KNOTS)** | | |
| 0-50 | XXXX | XXXXXXXXXXXXX XXXX |

| | | |
|---|---|---|
| 50-100 | XXXXX | XXXXX |
| 100-150 | XXX | XX |
| 150-200 | X | X |
| 200-250 | | |
| 250-300 | | |
| 300-350 | X | |
| 350-400 | X | |

**(IN WINDS 21 TO 25 KNOTS)**

| | | |
|---|---|---|
| 0-50 | XX | XXXXXXXX |
| 50-100 | X | XXXXX |
| 100-150 | XXX | X |
| 150-200 | XX | |
| 200-250 | | |
| 250-300 | X | |

**(IN WINDS 26 TO 30 KNOTS)**

| | | |
|---|---|---|
| 0-50 | X | XX |
| 50-100 | XX | |
| 100-150 | X | |
| 150-200 | | |
| 200-250 | X | |

(There were two tests over 30 knots, yielding separations of 250 and 300 yds., but both by conventional methods, thus yielding no comparison).

**SUMMATION OF TESTS**

| MAXIMUM SEPARATION, (yds) | CONVENTIONAL METHODS | QUICK-STOP METHOD |
|---|---|---|
| 0-50 | 12 (17%) | 82 (71%) |
| 50-100 | 26 (37%) | 21 (18%) |
| 100-150 | 10 (14%) | 7 (6%) |
| 150-200 | 11 (16%) | 5 (4%) |
| 200-250 | 3 (4%) | 1 (1%) |
| 250-300 | 5 (7%) | |
| 300-350 | 1 (1%) | |
| 350-400 | 2 (3%) | ___ |

| | | |
|---|---|---|
| | 70 | 116 |

**TABLE 2**
**NASS DATA SHOWING TIME ELAPSED TO BRING VICTIM ALONGSIDE USING QUICK – STOP VERSUS OTHER METHODS**

(In Table, each letter X represents one test)

| ELAPSED TIME (Minutes) | CONVENTIONAL MANEUVER | QUICK-STOP MANEUVER |
|---|---|---|

**(IN WINDS 0 TO 5 KNOTS)**

| | | |
|---|---|---|
| 0-1 | | XX |
| 1-2 | X | XX |
| 2-3 | X | XXXXX |
| 3-4 | | |
| 4-5 | X | |

**(IN WINDS 6 TO 10 KNOTS)**

| | | |
|---|---|---|
| 0-1 | | XX |
| 1-2 | X | XXXXXXXXXXXX XXX |
| 2-3 | X | XXXXXXXX |
| 3-4 | XXXX | XXX |
| 4-5 | | XX |

**(IN WINDS 11 TO 15 KNOTS)**

| | | |
|---|---|---|
| 0-1 | | XXXXXXXXX |
| 1-2 | XXXXXX | XXXXXXXXXXXXX XXXXX |
| 2-3 | XXXXX | XXXXXXXXXXXX |
| 3-4 | XXXXXXX | XXXXXXX |
| 4-5 | XXX | XXX |
| 5-6 | XXXXX | |
| 6-7 | X | |

**(IN WINDS 16-20 KNOTS)**

| | | |
|---|---|---|
| 0-1 | XXX | |

| | | |
|---|---|---|
| 1-2 | X | XXXXXXXXXXXX |
| 2-3 | XXXXXXXX | XXXXXX |
| 3-4 | XXXXX | XX |
| 4-5 | XXX | XX |
| 5-6 | X | |

**(IN WINDS 21 TO 25 KNOTS)**

| | | |
|---|---|---|
| 0-1 | | XX |
| 1-2 | XXX | XXXXX |
| 2-3 | XX | XXXX |
| 3-4 | XX | X |
| 4-5 | XXX | XX |
| 5-6 | X | X |

**(IN WINDS 26 TO 30 KNOTS)**

| | | |
|---|---|---|
| 0-1 | | |
| 1-2 | | XX |
| 2-3 | XX | XX |
| 3-4 | | X |
| 4-5 | XX | |

**SUMMATION OF TESTS**

| ELAPSED TIME (MINUTES) | CONVENTIONAL METHODS | QUICK-STOP METHOD |
|---|---|---|
| 0-1 | 3 (4%) | 15 (11%) |
| 1-2 | 12 (17%) | 54 (41%) |
| 2-3 | 19 (26%) | 38 (28%) |
| 3-4 | 18 (25%) | 15 (11%) |
| 4-5 | 12 (17%) | 9 (7%) |
| 5-6 | 7 (10%) | 1 (1%) |
| 6-7 | 1 (1%) | ___ |
| | 72 | 132 |

The excellent showing turned in by the quick-stop is apparent, both from the plots of individual test results and from the summary figures at the end. In assessing these, it should be realized that simple averages don't necessarily tell the whole story. For example, given that the quick stop method may average well, one might still fear that the averages could conceal a few serious foul-ups that would endanger the victim more seriously than might be expected with conventional methods – which latter might be perceived as slower but surer. This is a valid doubt; however, the data clearly show that the quick-stop results are more closely bunched than are the conventional results; and show similar results over the entire range of wind speeds, results not to be expected if foul-ups were particularly characteristic of quick-stops. It can still be argued that some monumental foul-up could result from a quick-stop, and so it could. Such worries, however, do not seem to weigh very heavily in view of the large number of trials that have been made; and in this connection it should be noted that in addition to the NASS trials, around 400 quick-stops have been made by the SF with good results (see later discussion of the SF tests). Nor should it be forgotten that the conventional methods can have risks peculiar to them – viz: more difficulty in locating the victim.

One needs also to ask whether there is any factor that could seriously bias the results. Of course, the crewmembers in the NASS program were aware that tests were being made, and that one of the procedures involved the quick-stop. No doubt there was considerable discussion about these alternative methods; however, NASS had been practicing the conventional reach–off-and-return maneuvers for years – so that these must have been more familiar than the novel quick-stop. All in all, it is difficult to argue that there was some bias toward quick-stop.

One point should be emphasized strongly; and that is that the crews in these tests had probably practiced more overboard drills than the usual sailing crew is likely to have done. Indeed, it is an unfortunate fact that when people get into a boat, not many of them spend much time making man-overboard drills. Thus, if the skipper expects his crew to execute quick-stop drills with a degree of success represented by these statistics, he and his crew will have to engage in practice enough to insure that the procedures can be brought off without confusion and without having to explain the desired procedures while they are going on. After this sort of crew preparation, a good operating routine would call for each watch coming on deck being advised as to the particular man-overboard procedure in effect in the event of an incident.

### B. Quick-Stop Procedures:

As mentioned above, the essence of the quick-stop system is to reduce boat speed immediately, so that the boat stays closer to the victim, and returns to him quicker. The way to reduce boat speed quickly is to reduce the propulsive power of the sails quickly. If sailing close-hauled or on reaches, the boat is, at once, headed into the wind or beyond, without altering the sheeting, except possibly to take in slack. The sails will go aback, the boat will slow, and the turn is continued until before the wind, when the headsail can come down or not, depending on the contemplated recovery method (see below). At this point, the boat is still quite close to the victim. She has not gone far because her speed has been killed quickly.

The procedure under spinnaker differs somewhat. The boat is headed up at once, as before, into the wind. As she comes up, the pole is let forward to the stay, or in any event far enough to insure that the spinnaker will come down well when the halyard is released. The foreguy can be taken in to keep the pole from skying. The sheet is not disturbed except possibly to take up some of the slack. When the spinnaker begins to come aback, and reaches the spreader (not before), the halyard is let go, and the spinnaker falls mainly on the deck. Again, the boat's way is greatly reduced, and the distance to the victim remains short. The most difficult part is to resist letting go of the halyard too soon. Practicing is most advisable, and leads to good results. In one NASS trial, for example, the crew were all below except for the helmsman, who coolly went at it, and got the spinnaker on deck single-handed. As with the rest of all these maneuvers, the key is practice.

There are some situations in which a quick-stop procedure may not be advisable, for example, if there is also a blooper flying (though some good quick-stops have been made with this configuration); or if the boat is sailing wing–and-wing, with the main guyed forward, and the jib held out on a pole, and so on. If and when such sail combinations are to be used, the proper course for the skipper, upon entering into this sort of configuration, is to determine which overboard tactic is to be used if an overboard should occur, and to advise the crew accordingly. (Some experimentation is being conducted now by the SF in order to develop optimum procedures for these difficult configurations.)

In boats with split rigs, the handling of the after sail will require experimentation. In the yawls operated by the NASS, the mizzen caused no particular trouble in winds under about 15 knots. Over that, it was found best to lower the mizzen in order to execute a proper quick-stop.

## C. Recovery Procedures

The procedures for getting the victim back aboard that have been developed by NASS and the SF differ, the two lines of investigation having been keyed to the particular interests of the two groups. In the NASS case, the objective was to optimize the recovery with a full crew of vigorous young men aboard; while the SF studies concentrated on situations in which the available manpower and existing gear would be insufficient to get the victim aboard – in the ultimate case that of the man-and-wife crew in which the man goes overboard.

Both organizations reviewed and, when desirable, tried various methods that have been used or proposed in the past. There was little satisfaction with nets, scooping up with sails, or even ladders – the latter being usable in calm conditions with a victim still in good shape, but ineffective and even dangerous in rough water (particularly stern ladders). Improvised hoisting slings will work if the victim can be got into one – not always easy (see below). Out of all this, two systems proved effective and reliable in many tests – the sling system that was developed by the SF, which they named the "Lifesling"; and the NASS method (usable with a full crew) which has been nicknamed the "Macho" method.0

### A. The SF "Lifesling" System

The Sailing Foundation undertook their research because of some tragic incidents that had occurred in their area, involving small cruiser-racers being sailed by man-and-wife, in which the man fell over and could not be got back aboard. Accordingly, they concentrated their attention on systems in which a solution to the difficult problem of hoisting the victim back aboard in such circumstances would occupy a major position in the procedure.

Their committee studied many case histories, and conducted tests of a number of schemes that have been suggested over the years, plus various ideas that they conceived in the course of the work. During this explanatory period they identified three main problems, all of which would prove difficult with only one person aboard: (1) keeping the victim in sight; (2) maneuvering, and establishing and maintaining contact; and (3) lifting aboard.

The first of these problems was solved with the quick-stop method, which they and the NASS apparently came to independently. The second was solved by towing a floating object, such as ring lifebuoy, tethered to the boat with a floating line; and by sailing around the victim, making contact after the manner employed in picking up a water skier who has fallen. For the third, lifting aboard, they worked first with simple slings, but this was not satisfactory because of difficulty in transferring the victim from the ringbuoy to the sling. (Not the least of the latter problems was reluctance of the victim to leave the lifering.) The outcome of all this was to make the towed floating object capable of also acting as the lifting sling, so that the victim would not have to transfer from one to the other. This was the origin of the "Lifesling". It is shaped like the "horsecollar" used in helicopter rescue operations, but has been given flotation (approximately that of a type IV PFD).

The procedure eventually worked out by SF is as follows, (taking a no-spinnaker case for illustration):

1. Immediately turn the boat into the wind to reduce or kill way. Release the sling, which is permanently attached to a strong point on the boat by a 150-foot (minimum) floating tether line.
2. Fill sails and tack, leaving the jib aback. Sling tether line pays out from stuff bag.
3. Sail circles around the victim until contact is made. (This usually takes one or two circles, and, in quite rare cases, more).
4. Head to wind and drop sails.
5. Haul the victim alongside, preferably on the windward side, from amidships to the quarter wherever there are available cleats and winches. Pull up on the tether line, with winch assistance if necessary, to get the victim's head and shoulders out of the water, and cleat it. The victim is now safe.
6. Attach a 3 or 4 part tackle to a halyard, haul it up to a predetermined point, high enough so that the victim can be hoisted up and over the lifelines, and secure the halyard. Attach the lower end of the tackle to the (previously-sized) loop in the tether line that passes through the D-rings of the sling, and hoist aboard, using a winch on the fall if needed. On larger boats, the winches available may be sufficient to hoist the victim aboard by the halyard alone without the aid of the tackle. If the halyard winches are too small, a sheet winch can be used. Making the halyard tail long enough to reach such a winch makes this quite easy.

After the SF had made a considerable number of trials of the system with their own committee, they then recruited 15 couples, who had a variety of boats, gave them a classroom lecture and familiarized them with the equipment. They were then invited to perform a recovery if they wished to, and they all did so. In each case the skipper was a woman who had not previously seen the method. They all set out, and in each case the husband jumped overboard (into about fifty-degree water), wearing a wetsuit and life vest, leaving the wife to make the recovery. All were successful, the times of recovery ranging from 7.5 to 26 minutes. The troubles causing delay were not serious ones (overrides, foul-ups in the tackle, and the like). The SF expects that most intermediate sailors can accomplish recovery in about 12 minutes.

Beginning in late 1984, they held a series of on-the-water clinics, in which over 300 recoveries of live "victims" were made. Of these, only four were failures, all by sailors who either had never taken the helm before, or had never taken a sail down. The tests were made in a wide variety of boat types.

A point of caution in the process is the possibility of the victim in the sling being towed too fast. If contact is made and the victim gets into the sling before the boat is stopped, and is getting too much water in the face, he can turn around in the sling, making it easier to breathe. A test made by the SF, in which a man facing backwards in the sling was towed at various speeds, showed that he could breathe at speeds up to 4.8 knots. Conceivably, some trouble of this kind might happen; however, in the over 300 tests mentioned above, there was no instance of towing at troublesome speed.

The SF emphasizes the strict following of a set procedure, feeling that, in an overboard situation (even in a test with a live victim), there is a lot of adrenaline running, and that the assurance afforded by abiding by a set ritual strongly acts to prevent unfortunate decision-making under pressure.

### B. The NASS "Macho" System For Full Crew

The Navy people soon demonstrated to their satisfaction that with their crews it is possible, once the victim is alongside, for four or five men simply to grab the victim and hoist him aboard, a method that seems applicable to full racing crews generally. In the course of practicing this, they developed a set of related procedures and equipment, along the following lines:

1. It is preferred that the boat not be steered to a position alongside the victim, but rather to stop the boat a modest distance away, to leeward of him. The reasons are (a) in rough weather, the

pitching motions can be violent, and for one end of the hull, for example, to come down on a man in the water could harm him, perhaps seriously; (b) the boat, if to windward, could drift down and over him; and (c) the natural attitude of the man in the water is with back to the wind and sea, so if the boat is to leeward of him, all parties communicate better.

2. To get the victim alongside and under control, they throw a heaving line to the victim, who is then hauled in alongside.
3. There was considerable experimentation with heaving lines, it being desirable to be able to throw reliably a fair distance into the wind. The best arrangement was a rig consisting of a buoyant throwable object such as a ball made of a bolt with foam plastic taped around it, attached to a long length of light floating line. This can be stuffed into a cloth "sock" – a tube of perhaps arm-length, into which the ball is stuffed first, then the line. The sock containing the ball and much of the line is thrown with a sidearm swing, and the line feeds out from the sock as it flies. It was found that this can be thrown a considerable distance into the wind, and has proven quite satisfactory.

The procedure, then, taking a no-spinnaker case for example, is as follows:

1. Immediately throw a PFD, which is kept handy to the helmsman for this purpose and is not encumbered with other gear.
2. Head up, come on around with the jib aback, and drop it when before the wind.
3. Maneuver so as to fetch up, preferably somewhat to leeward of the victim with wind abeam, engine started but propeller not engaged.
4. Throw a heaving line, pull the victim alongside, grab him and hoist aboard. The procedure for immobilizing the boat, if necessary, is to position the main fully out abeam, secure it there with a foreguy if necessary, and put the helm down in a "heave-to" position (a maneuver developed by Rod Stephens, by virtue of which the boat should stay with wind abeam with a small drift to leeward). The whole procedure is a very rapid one.

The NASS will carry the Lifesling, describer earlier, on their boats, in addition to any required gear, and would expect to use it in short-handed recoveries.

### D. Recovery Of Disabled Victims

A disabled person in the water adds enormously to the gravity of the situation. It should be noted that, whatever the nature of the injury may be, the greater speed of the quick-stop maneuver cannot but be of value.

For the present purpose, we can define disabled as being unable to get into a Lifesling, or to hold onto a heaving line. In such a situation, the only course appears to be putting another man in the water, unless the accident occurs with other help nearby. It would seem sensible to let the rescuer go out on a tether, or, if a Lifesling is deployed, wearing a safety harness with its hook clipped around the Lifesling tether line.

### E. Night Recovery

The SF made a series of tests at night in about 30 knots of wind with a live victim. They were using their Lifesling system, and found that with a water activated light on the sling, and another on the victim, night recovery presented no problem.

In these tests, both strobe lights and steady ones were tried – the steady light giving the better visibility. It was found to be advisable for the light on the person overboard to be attached as high up as feasible; though the lights were found to show reasonably well when under water.

The shorter distances from boat to victim obtained with the quick-stop method of maneuvering are of evident advantage in night recovery.

## IMPLICATIONS FOR CONVENTIONAL OVERBOARD GEAR:

The ORC Special Regulations provide for a horseshoe lifebuoy equipped with a waterproof light, and drogue, for Category 4; plus, for Categories 1, 2, and 3, another horseshoe lifebuoy with a whistle, dye marker, drogue, self igniting high intensity water light, and pole with flag, which is tied to the buoy with 25 feet of floating line.

In the SF system, experiments with the ORC pole-and-tethered-horseshoe rig, in conjunction with the Lifesling, showed that the pole/horseshoe tended to foul the Lifesling tether line, and was thus detrimental to the operation. They did find that the pole alone would not interfere with the operation of the sling system, and view the pole as an appropriate marker to launch, to mark the location, in the event of a foul-up in their normal recovery process.

NASS noted, early in their testing of the quick-stop maneuver as compared to the conventional methods, that it took appreciable time to launching the pole-and-ring overboard gear, and began to record the time required to launch this gear; and, shortly thereafter, also the time taken simply to throw a PFD overboard, as an alternative method of providing flotation.

Of 167 trials in launching the pole-and-ring, 18 (11%) resulted in foul-ups unduly delaying the launch. In the remaining 149 trials, the average time to launch the gear ranged from 2 to 60 seconds and averaged 16.8 seconds. The time required for the helmsman to grab and throw a PFD loose in the cockpit was measured for 125 trials and averaged 6.1 seconds; and the only events that might be considered as foul-ups were 3 in which the helmsman apparently forgot to make the throw at once.

Th length of time needed to launch the standard pole-and-ring, the wide variation of launching times, and the considerable number of foul-ups, made it evident that in many instances the standard pole-and-ring would fetch up a considerable distance from the victim in case the boat was moving with speed, as she might be when using conventional recovery methods rather than quick-stops. There was concern that the victim might be unable to reach the flotation gear in some cases, and this concern became stronger after NASS made some swimming tests with men in top condition wearing full racing gear. After considering all this, NASS made the decision that standard practice would be to throw a PFD at once in place of the standard ORC gear. The latter would be reserved for use in the event of a foul-up in the quick-stop recovery system, so as to have the pole mark the spot in the event of having to sail off and return.

There are devices that provide instant launch of conventional gear, and the Navy has training vessels that carry these devices. There is no doubt that these have their place, but it seems likely that racing skippers either will prove loath to utilize them (for fear of accidental loss of the gear, or loss of time recovering it from accidental launch), or will be tempted to lash the gear down, thus defeating the instant-launch feature.

To summarize, neither the SF or NASS recovery system would routinely employ the standard ORC gear. In both systems, however, use would be made of the pole as a marker in the event the normal operation of the system miscarried. They would therefore, retain the pole (or some form of marker) for this contingency.

It seems evident that, to the extent that the new techniques are regarded as desirable for racing fleets, there is room for modification of the required ORC gear to make it more compatible with the recovery methods described here. It is hoped that the material presented here will be found of use in the course of such consideration.