The Art of Being Found at Sea

A review of precautions and safety devices for divers

Surfacing from a dive with no boat in sight can be a harrowing experience. This occasionally real scenario briefly gained wider public attention when *Open Water* hit the screens in 2003, a horror movie that cost $120,000 to make and grossed a total of $55 million at the box office.

In the actual events on which *Open Water* is based, sloppy procedures on part of the boat operator were a main contributing factor to (spoiler alert) the death of two divers. Our industry has since learned from this and other cases, and headcount procedures using physical tags and roll calls have become the standard on larger boats and liveaboards.

However, being forgotten is far from the only way of becoming lost: Especially in locations with strong currents, divers frequently surface a long distance from where they started. Several teams diving from the same boat and surfacing far away from each other is another contingency: By the time the boat has caught up with one group, the other may be out of sight.

An ounce of prevention…

As always, an ounce of prevention is worth a pound of cure: Besides a robust headcount system, communicating the dive plan to the boat crew is of key importance: How long will the dive be? Is drifting part of the plan? If it's a decompression dive, at what point in the runtime schedule should the surface crew expect to see a DSMB coming up? As long as the divers stick to their plan, this will go a long way toward avoiding the need for a search.

Yet there are no guarantees. Unexpected conditions or underwater emergencies may change the course of any dive, and surface searches do happen. Even though my personal experiences do not qualify as emergencies by any stretch, I have spent more time than I liked drifting toward nowhere in particular, watching conditions get rougher, holding up my DSMB and wishing I had a way of letting the boat know that, *guys, I've been done doing deco for quite a while now and very much wouldn't mind getting picked up. If it's not too much of an inconvenience to you. [Insert expletive.]*

Fortunately, technology is here to help. From the simple to the sophisticated, here is an overview of some options available to divers seeking to improve their odds of getting back on the boat in time for lunch.

Basics

These days, the importance of surface signaling devices is being taught as early as the open water course. Even if a diver isn't yet able to deploy a **DSMB** from underwater, inflating a safety sausage at the surface vastly increases the likelihood of being spotted. **Acoustic devices** like whistles have a rather short range, especially when there is wind, but a **mirror** to catch the sunlight can be useful. Always carrying a **torch** is a good idea, in case night falls before a diver is found. Particularly concerned (or paranoid) divers may even bring **a pouch of drinking water** and a floppy hat in a pocket, as precautions against dehydration and sunstroke while a potential search is underway.



Are the basics good enough?

When the skies are clear, the only hard limit for visibility at sea is the horizon. How far away that is depends on the elevation of the spotter. For a small boat (eyes 2 m above the surface), it's about **5 km**.

For a larger one (4 m above surface), this goes up to **7 km**.[(1)] Except for very long dives and very strong currents, this should be plenty – assuming it is daytime, the skies are clear, the diver has a DSMB up, and the spotter is using binoculars. Fog or rain can drastically reduce visibility, and even mild waves can make a drifting person much harder to spot, even if they theoretically would be within visual range.

Personal radio-based systems

There are several options available to those of us who wish to add a layer of safety to their diving. Which one will be the most useful in a given situation depends on the location and circumstances. These devices also vary quite a bit in cost.

The *Nautilus LifeLine Marine Rescue GPS* was specifically designed for diving and is well known among scuba enthusiasts. It is depth rated to 130 m and has a 5-year battery life. However, it should be noted that the Nautilus does not trigger a general search and rescue. Instead, it only signals nearby boats – specifically those equipped with a **radio** and **AIS** (Automatic Identification System).

This may work quite well in many places, but AIS – or boats equipped with radios for that matter – cannot be taken for granted everywhere. The utility of a Nautilus varies significantly with location and may be near zero in some areas. Its range is specified as up to 50 km, but this holds up only under ideal circumstances. In rough conditions, it will be much reduced.



The ***Ocean Signal RescueME PLB1*** and ***ARC ResQLink View*** are two devices of a class called ***PLB***, for *personal locator beacon.* Unlike the Nautilus, which relies on AIS and marine radio, PLBs contact a **satellite network** to trigger a global SOS alert.

With depth ratings of 15 and 5 meters, both models require waterproof cases to be taken on dives. In addition to GPS, the ARC system also uses the EU's Galileo satellite network for positioning, and it comes with built-in strobes in the visible light and infrared ranges.

PLBs work anywhere in the world. However, there are countries, particularly in Asia, where they are subject to government regulations and may be illegal to use or carry without a permit. Divers who wish to bring a PLB on their trip are well advised to do some research first.

While not technically a PLB, the ***Garmin inReach mini*** fills a similar role. One could describe the inReach as a tiny **satellite phone**, even though it can't make actual calls. When its SOS function is activated, the inReach contacts Garmin's proprietary rescue network to trigger an emergency response. However, the inReach can also be used to send and receive e-mail and SMS messages via satellite, for example to transmit a GPS location to the dive operator, without a global SOS alert. Its two-button user interface makes sending longer messages inconvenient. To be used for diving, the inReach must be purchased with a waterproof case, which has a depth rating of 100 meters.

This device is the most expensive to buy and requires a monthly subscription on top to remain operational. Its battery needs to be recharged relatively frequently. Like PLBs, the inReach is a satellite communication device and may as such be subject to regulations – so please make sure you won't get arrested at the airport before traveling with it!

An effective, low-tech alternative or addition to radio devices is to carry a **pyrotechnic signal flare** in a

watertight container, such as an old primary light canister. Fired from the surface, a typical flare will rise to an altitude of 300 m, which gives it a theoretical horizon of 60 km. It will burn with a very bright light for about 40 seconds. A flare at sea is universally understood as a distress signal. Unlike electronic systems, which remain active for 24 hours or longer before running out of battery, a flare can be fired only once.

Trying to bring a flare on a commercial flight would of course be highly illegal. This is not a travel-friendly solution, but a very useful one for people who dive locally.



Boat-based systems

Some operators, especially **liveaboards** in remote locations, use safety devices consisting of a receiver installed on the boat and a number of **transmitters** carried by divers. Once a transmitter is activated and at the surface, anyone in range with a **receiver** can see the transmitter's location on a screen.

The market leader for this kind of device is called **ENOS**, a German company that has been around since 2004. The ENOS system was developed specifically for divers. An alternative called GPacer has recently become available. GPacer was originally developed for (and continues to be used by) the Taiwanese navy.

The company is in the process of entering the watersports market.[(2)]

Unlike satellite-based PLBs, ENOS and **GPacer** transmit their locations only to dedicated receiver units nearby. As with other systems, the transmitter must be at the surface to work. Its range is limited by the horizon and physical obstacles, such as islands and coastlines. On the upside, these systems can be used in non-emergency situations on a daily basis, as a backup and complement to DSMBs.



ENOS and GPacer are great solutions for dive operators wishing to improve the safety of their customers: Mount a receiver on the boat, give a transmitter to every diver, and you're good to go. If several boats in the same general area are equipped with receivers, this can create an excellent safety network, especially when operators collaborate. However, dependence on dedicated receivers means that these devices are not suitable for purchase by individuals.

Conclusion

There you have it: A comprehensive overview of ways and means to avoid becoming a protagonist in the next pelagic survival horror movie. Personally, I believe that every diver should have the basics covered. A DSMB and torch are easy to purchase and carry, even if you're using rental equipment otherwise. Which of the more advanced options are most suitable for you depends heavily on the location and circumstances of your diving. Be sure to check with local operators and heed their advice. They will know best.

Stay safe, and happy diving always!

Thanks for valuable input on technical details are owed to DAN Director of Safety Programs Guy Thomas, as well as to my friend and dive buddy Alun Harford.

Footnotes:

1. A good formula for approximating the distance of the horizon is *sqrt (elevation above sea level in meters) x 3,600 m*
2. Tech Asia, the technical dive operator I work with in the Philippines, has been using the GPacer

system for well over a year now, with good results.

About the author

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