

Some reflections on Solo (Cave) Diving

(already integrated partly into the Cave Diving Standards of Swiss Cave Diving)



Much paper and ink has been used on this topic, especially in the cave diving community. „Sport divers“, coming from the open water and entering the cave diving sector are trained and familiar with all aspects of buddy- or team-diving.

Their argument is: *“in case of.....my buddy could help me...”*

Unfortunately, some of these “buddy” divers forget that their buddy expects the same from them and use (or better: misuse) the buddy system to hide their own lack of skills and competence.

On the other hand, many cavers and cave researchers for whom diving is just an additional annoyance perform their underwater activities on their own.

Their argument is: *“...too busy ...and in some places physically impossible to take care of any other person, I prefer relying on myself...”*

Many of these research people are very strong (if not to say “special”) personalities who would never integrate themselves well into a team.

Advocates of either opinion claim that they feel safe and comfortable the way they dive and both sides do a tremendous amount of diving.

To cut a long discussion short, this is not a question of right or wrong, black and white, but need much deeper elaboration than could be done here.

Also, when this topic is discussed, it often gets forgotten that not only technical and procedural aspects must be accounted for, but at least for the same amount, mental stability, strength of one’s will, the honest intention to act as a team player and other „soft-factors“ must be considered as well.

So once again, one must see the whole picture and apply common sense!

What is „buddy diving“?

Most divers will simply say „when I’m diving with another person“. Obviously this is not true; moreover it is a dangerous misbelief!

A true buddy team knows exactly that every one of them can rely to 100% on his partner for whatever needs and situations.

The basis for this belief is a sound common dive plan (depth, time, gas, deco, activities, special points), safety checks and drills, familiarity with the other’s skills, strengths and weaknesses, a thorough emergency plan, corresponding equipment and configuration, a strict adherence to the dive plan, avoidance of unnecessary stress factors, a sound training, proper certification (!), a good physical shape, mental stability and the intention to follow a defensive diving attitude, just to name a few parts out of this complex system.

An even more important aspect of a good buddy will be that he/she has a strong feeling of responsibility for the well-being of everyone of the group.

In every group you also have leaders and followers. However, in a well functioning group, leaders must take themselves back for not becoming too dominant and followers should never let themselves be guided to the point that they perform "trust-me dives". There should always be a well-balanced mixture of both types.

It is exactly this type of diving that the philosophy of Swiss Cave Diving (and CMAS) stands for, like most if not any of all other respected dive- and training organizations world-wide.

What is then a „solo dive“?

Under the definition of Swiss Cave Diving and CMAS this is a dive where the diver is absolutely on his/her own and has no support or backup of whomever. So-called partners may even be physically present, but they do not act as a buddy team. In a true emergency one can only hope and pray that his fellow diver is able and willing to help.

It happens more than expected that in reality a buddy pair is solo diving, because they had no planning, no safety checks, no gear-match, no common gas-planning, do not know each other as buddy, do not know very well the dive site, have never done some exercises together, etc.

So at the end, it’s more by coincidence that two (or more) individuals are diving at the same site, at the same time, have more or less the same profile.

Of course, under such circumstances, the safety of every single diver out of this group is based on nothing less than a big portion of good luck, strong faith in whatever godness and the skills of each one for him-/herself.

This adventurous, if not to say careless type of diving is neither endorsed nor tolerated by Swiss Cave Diving or CMAS. In most jurisdictions such diving attitude has already been ruled (by some European National Supreme Courts) as gross negligence with all penal consequences.

Short siphon solo “dives” during cave exploration

For most cavers, finding a water-filled siphon is just another annoyance, because it means “going underwater”. Many of these water-filled passages may be quite short, a couple of meters only. Also, some of them are small, have a lot of sediments, produce heavy percolation and heavy low to zero visibility (at least on the return).

A classical approach with backmount D10 or D12, in combination with stage tanks, will have no chance at all.

Sometimes during these short „dives“, not even fins are used, the diving caver „walks“ underwater until he reaches the next surface. He/she may (hopefully) be secured by a buddy line and a line tender. In a well-prepared and professional team, a „safety diver“ in full gear with a small reserve tank will also be waiting at the entrance.

Of course in such a case, taking a buddy into these unexplored, mostly very small and silty passages would not add anything to overall safety, to the contrary, would even add to the complexity and raise the risk level.

Nevertheless, this type of underwater cave exploration needs specialized equipment, procedures and training and is NOT part of the Swiss Cave Diving or CMAS training scheme. Both agencies accept this type of “cave diving” as a necessary and inevitable approach in cave exploration, but does NOT offer training and will NOT issue certificates in this field.

Push Dives (French: plongée de pointe)

Here, a smaller or bigger team tries to add some more distance to the explored part of a cave system. This undertaking is mostly carried out in expedition style. Today's distances to be covered, depths, corresponding logistics and financial requests do not allow a single individual to have a success anymore.

Sometimes during days and weeks, a whole team of support divers prepare for all needed logistics, started at the base camp, the technical infrastructure, preparing for gas deposits, securing all lines, installing decompression habitats etc. etc.

All activities, all dive- and emergency procedures, support protocols etc., are meticulously planned, documented, trained and carried out.

On the final day, one, sometimes two so-called push divers, do the final „attack“. So even if they may be alone for this part of the dive, they can rely on a strong support team and everything is planned and prepared in a way that for all foreseeable worst case scenarios the push diver(s) has/have a fair chance to get back safely.

It should also be mentioned that such divers are by no way young and adventurous “rookies” playing with their lives. In most cases such divers have a decade-long cave diving career behind them and an unsurpassed accumulated experience while rising “through the ranks”.

Again, Swiss Cave Diving and CMAS accept this type of diving as a necessary and inevitable approach in today's cave exploration, carried out by well-trained and skillful people and with the appropriate equipment but does NOT offer training for such highly specialized activities and will NOT issue certificates in this field.

Besides this, it is the conviction of SCD and CMAS that the best prerequisite for this exploration-like cave diving is the SCD and CMAS cave diving training up to Full Cave Diver, simply because (among many other factors) before you know how to dive on your own, you must know how to act in a group, as part of a true buddy team, even if every single member in this team could easily (at least from a technical point of view) rely on him-/herself.

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We strongly motivate everyone to read the following article
about solo-diving in British sumps.

Why Solo Diving is Appropriate in UK Sumps

By David Brock

5 May 2005 [nevertheless still valid!]

Cave diving in the UK can trace its roots back to early dives by Graham Balcombe and Jack Sheppard in Swildon's Hole in 1934. The procedures developed in the 30's were formalized by the founding of the Cave Diving Group in 1946. A constant theme throughout the existence of the CDG has been to adapt materials and methods to the job in hand and to be open to continuous improvement.



Cave diving has become extremely popular throughout the world. Florida is one of the regions blessed with many cave diving sites of outstanding quality and easy access. Consequently, there has been an explosion of popularity in cave diving in the USA. It is estimated that there are as many as 20,000 cave and cavern divers in Florida alone. These divers are organized into a number of national bodies including the National Speleological Society, Cave Diving Section and the National Association for Cave Diving. The generally agreed advice from this wealth of experience is that cave diving in the USA should be conducted by teams of divers in a buddy system and that solo diving introduces an unnecessary level of risk. Despite this advice the Cave Diving Group continues to recommend solo diving as the safer alternative for diving in the UK. Why is that?

In 1997 the Health & Safety Executive commissioned a report into the risks of diving, looking at more than 1,000 incidents [1]. One of the recommendations for cave diving in that report is to “not enter spaces which restrict movement to the extent that assistance to a buddy would be impeded”. As there are no UK sumps that allow unimpeded buddy diving, the recommendation suggests that it is unwise to do any UK sump diving using the conventional buddy system of diving. Yet over the last 70 years the CDG have published reports of over 4000 cave dives in over 1300 sites and have conducted many more unpublished dives. This suggests that there is a substantial body of cave diving that is being conducted outside the recommendations of the conventional buddy system.

The first key point cited in the 1997 Health & Safety Executive report [1] is:
“1. There are a small number of repeated causes associated with the majority of fatalities. If these causes are eliminated then the number of fatalities would have fallen from 286 to 8. Since all of the procedural errors are avoidable by a well trained, intelligent and alert diver, working in an organized structure, it may be concluded that the low accident rate in scientific diving, in the fire service, police, coastguard, etc., who all use SCUBA, is due to this factor.”

The CDG believes that their cave diving procedures, developed by continuous improvement over 70 years, represent the best way to produce a well trained, intelligent and alert diver, working in an organized structure hence represent the safest way of tackling UK sumps.

There are many hazards associated with cave diving. Some, but not all, of the hazards of cave diving have been identified by the CDG in the Statement of Inherent Risk [2]. The buddy system was introduced in open water diving to minimize the risks associated with open water diving hazards, but when applied to the UK sump diving situation, buddy diving introduces additional risks. Some of the advantages of solo cave diving over buddy cave diving are cited in the essay "Cave Diving - British Style" [3]:

- There's no - one to get physically jammed in the passage behind you (thereby blocking your exit).
- There's no - one behind you who may get tangled in the line, and have to cut it - leaving you with no guide home.
- • There's no - one to accidentally disturb your 'out tags' at line junctions (e.g. in one cave there are 10 branch lines off the main line in the first 500m of passage).
- There's no - one to cause silt problems (but yourself).
- There's no chance of being called upon to share air - in small passages.
- There's nothing to get confused about - communication in sumps
- Varies from the difficult to the impossible.
- There's no-one to provide you with a false sense of security.
- There's no-one to worry about, but yourself - you can concentrate on your own safety.

Solo diving mitigates the risks introduced by buddy diving. One of the objectives of the CDG is to develop diving practices that enhance the safety of solo cave diving.

Cave Diving has a relatively small number of participants in the UK and although it has developed over a period of 70 years, there are insufficient incidents of failure to conduct a robust quantitative analysis of failure patterns. Outside the UK there is more information on failure patterns available, however the difference in the nature of the UK sump environment and the non - UK sump environments do not permit direct comparisons. With this caveat in mind, it is still useful to look at cave diving fatalities outside the UK.

In 1999, International Underwater Cave Rescue & Recovery published an Accident Analysis on 478 cave diving fatalities [4]. Of those 478 only 47 were cave trained. This emphasizes the obvious need for adequate training. Of the

40 cave trained fatalities where a cause was determined, the top most frequent causes quoted were, in order:

1. Depth
2. Training
3. Equipment
4. Line gap
5. Solo
6. Maintenance
7. Gas mixture problem
8. Entanglement

Due to the relatively shallow nature of UK sumps, depth and gas mixture are unlikely to be the major hazard in the UK. Solo diving is an issue outside the UK but this is because the non - UK cave diving training schemes do not prepare divers for solo diving. From this information it is probable that the most significant hazards in UK sump diving include, in no particular order:

- Training
- Equipment
- Line management

It is relevant to show that solo cave diving does not aggravate the risks associated with the major hazards of cave diving where buddy diving might mitigate the risks.

Training is a key part of the CDG's approach to cave diving. The CDG contributes to this area by the production of The Cave Diving Group Manual [5]. Additionally, the CDG has issued a Training Standard [6] to help guide both internal and external agencies in their delivery of suitable training for UK conditions. The CDG is a relatively small organisation with a limited capability to deliver training directly. It does however have a very strong ethos of training by example or mentoring more junior divers. This philosophy is described in the Cave Diver Education program [7]. There is no evidence that buddy diving has a significantly beneficial affect on the delivery of effective training.

Controlling the hazards and risks associated with cave diving equipment is the responsibility of the individual diver. The CDG's training and mentoring philosophy provides individual CDG divers with a large resource of experience to draw on when selecting and maintaining their equipment. This area is essential to safe cave diving and is strongly emphasized by the CDG. There is also a strong philosophy of complete redundancy for all critical systems.

There is no evidence that buddy diving has a significantly beneficial affect on the safety of diving equipment.

The third major hazard area is line management. The difficulties of laying and managing good lines to guide divers in UK sumps are enormous. Over the years this area of UK cave diving has been extensively researched. The first comprehensive review of this area was published by the CDG in 1981 in "Line Laying and Following" by Geoff Yeadon [8]. This pivotal reference has formed the basis of modern line laying and management. This is an area that is constantly evolving and new methods are regularly published in the quarterly CDG Newsletter. There is no evidence that buddy diving has a significantly beneficial affect on the safety of line laying and management.

The first British Sump Rescue Symposium held in 1986 looked at the issue of cave diving safety [9]. The published proceedings on Safe Cave Diving identified the technique of solo cave diving and strongly *advocated "the need for the cave diver to learn independence and to feel, when he is diving, that he is entirely on his own."* The advantages of buddy diving derive from promoting mutual self - help and aiding safety via the surface. Neither of these advantages is applicable to UK cave diving.

The symposium advocated an intelligent approach to cave diving; *"The most important piece of equipment the diver has is his brain. If he fully understands the implications of a dive an experienced diver will either take the necessary precautions or postpone the dive until he has gained the required knowledge, equipment or skill"*.

Diving with multiple concurrent divers does have a role to play in UK cave diving. There are certain tasks, such as underwater construction, that benefit from more than one diver being present at the same time. Additionally, there is a social dimension to recreational cave diving that results in more than one diver entering a sump at the same time. This is particularly likely if a caving project is conducted beyond a sump where mutual support may be critical to the success of a task. The overriding philosophy of the CDG remains that once you enter a UK sump you bear the full responsibility and accountability for your own actions. As such there is a deeply ingrained belief that a philosophy of solo diving is an essential requirement for safe sump diving within the UK. Multiple concurrent divers are effectively a team of solo divers, where each individual diver must be considered by all of the divers as a potential source of hazard. This form of diving is more accurately thought of as team solo diving.

Buddy diving is very different from team solo diving. In buddy diving a pair of divers are considered to be a unit and thus share responsibility and accountability for their actions. Buddy diving has been developed and modified for many different environments including some cave environments.

It would, however, be a grave and possibly fatal error to use an unmodified buddy diving system in the majority of UK sumps. Similarly it would be incorrect for a diver familiar with team solo diving to consider themselves fully conversant with buddy diving or to consider that solo diving is appropriate for all forms of diving.

There are clear additional hazards introduced by buddy diving and yet there is no clear reduction in the risks from the major hazards in cave diving gained through buddy diving. The Cave Diving Group recommends that solo and team solo diving are appropriate techniques for use in the exploration of UK sumps.

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