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**Does the buddy system really make
recreational scuba diving any safer?**

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ABSTRACT

This dissertation examines and evaluates whether the buddy system really makes recreational scuba diving any safer. It primarily focuses on examining the advantages and disadvantages of the system, with a secondary summary of whether or not the system makes diving safer. A conclusion was reached through a combination of analysing results gained from a questionnaire distributed via the internet and face-to-face to a sample of 217 divers and information and arguments examined in existing texts and articles.

The results have shown that the buddy system does little to improve the safety of divers whilst under the water, but on the other hand increases the safety of the diver on the surface. The buddy system's main advantages are that it is practical, offers experiential learning opportunities, provides an extra level of redundancy and makes diving more fun and a more social activity. Disadvantages include reliance on both divers adhering to the system correctly, providing dependant divers with a crutch, it can put two people at risk instead of one, it is reliant on the quality of each individual diver and it is misused by diving operations and agencies and subsequently followed blindly without thought as many divers are not taught any different.

In response to the question 'Does the buddy system makes recreational scuba diving any safer?' remains inconclusive. Much more research is required to provide a definitive answer. However, the author believes that the buddy system has the potential to make diving safer if divers were more self-sufficient and better prepared for emergency situations.

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GLOSSARY OF ACRONYMS AND DEFINITION OF TERMS

A

Air The most commonly used breathing mixture in recreational diving. It roughly comprises of 21% Oxygen and 79% Nitrogen. Also has narcotic properties at depth, but can be safely used down to approximately 60 metres.

Ascent Rate The rate at which a diver ascends. Most recreational diver training agencies teach divers to ascend slowly at no more than 18 metres per minute.

B

Bailout bottle See 'Pony Bottle'.

BCD Buoyancy Control Device, also known as a Buoyancy Jacket or Stab Jacket. A device attached to a divers cylinder, capable of being inflated with air to change the divers buoyancy characteristics.

BSAC The British Sub-Aqua Club, training agency.

Buddy Breathing Emergency out of air procedure whereby two divers share one air source whilst ascending.

C

CMAS Confederation Mondiale des Activites Subaquatiques, training agency. Founded by Jacques Yves Cousteau

Cylinder Large metal container filled with divers breathing gases to a very high pressure, available in many different sizes and capacities.

D

DAN Divers Alert Network, diving research agency. Founded to promote safer diving practices.

DCI/DCS Decompression Illness/Decompression Sickness. Medical conditions caused by nitrogen bubbles forming in the blood and tissues of a diver when he ascends too quickly or misses decompression stops. This causes a multitude of injuries. Also known as the bends.

Decompression The required act needed to remove excess gases from the blood.

Decompression Stops Stops at prearranged depths and times that are required to allow decompression.

DEMA Diving Equipment and Marketing Association, the diving industries most prominent trade show.

DIN Valve DIN (Deutsches Institut fuer Normung). A valve assembly whereby the regulator screws directly into the valve. These valves benefit from being able to manage higher working pressures and are generally more robust than the yoke system.

DIR Doing It Right. A holistic approach to diving which advocates common sense equipment choices and advanced skills and procedures.

Dive Computer A device either worn on the wrist or as part of a console that measures depth and time while underwater. It also calculates no-decompression stop time on the fly and decompression obligation using an algorithm.

DSMB Delayed Surface Marker Buoy. A brightly coloured signalling aid deployed by divers whilst underwater. It is attached to a reel that the diver keeps in his possession, allowing those at the surface to see the divers approximate position underwater.

DPV Diver Propulsion Vehicle.

G

GUE Global Underwater Explorers, training agency.

H

H-Valve An H-Shaped valve configuration enabling a diver to fit a single cylinder with two regulators, equipping him with another level of redundancy.

I

IANTD International Association of Nitrox and Technical Divers. Technical Diver training agency.

J

J-Valve A valve which has a built-in mechanism that signals when you are running low on air.

L

Lung Overexpansion Injury A lung injury caused by a diver either ascending too rapidly or holding their breath.

N

NAUI National Association of Underwater Instructors. American training agency.

Nitrogen Narcosis A narcotic effect produced by high partial pressures of Nitrogen. The effect increases with depth and the feeling is similar to being drunk.

Nitrox Any mixture of Nitrogen and Oxygen that has either more or less Oxygen than Air. Common mixes are EAN32 (32% Oxygen), EAN36 (36% Oxygen) and EAN50 (50% Oxygen, usually used as a decompression gas).

No-deco limits The 'No Decompression Limit'. The length of time that may be spent at a certain depth without having to make a compulsory decompression stop.

O

OOA Out Of Air!

P

PADI Professional Association of Diving Instructors, the worlds largest training agency.

Pony Bottle A small scuba cylinder with regulator commonly used as an emergency breathing system. It is usually worn mounted alongside a single tank, slung down one side of the body or across the chest.

R

Rapture of the Deep See 'Nitrogen Narcosis'

Rebreather A self-contained device used to recirculate and regulate breathing gases for the purposes of extended diving times and stealthy operation. On a fully-closed circuit rebreather this is accomplished by scrubbing Carbon Dioxide, and adding Oxygen as necessary to maintain a constant partial pressure of Oxygen.

Recompression The treatment procedure for decompression sickness and lung overexpansion injury. Treatment occurs inside a recompression chamber.

Redundancy The theory of having a back-up for every feasible equipment problem. A 'twinset' is a good example of redundancy.

Rule of Thirds The theory that 1/3 of your air supply should be used accomplishing what you want to achieve and another 1/3 used getting you back to the surface. The remaining third is reserved for emergencies. This practice is popular with cave and wreck divers.

S

SAC Rate Surface Air Consumption Rate. Underwater air consumption converted to an equivalent surface rate. Calculated in either BAR per minute or psi per minute.

SCUBA Self-Contained Underwater Breathing Apparatus.

SDI Scuba Diving International. The sister training agency of TDI, offering recreational diver training.

Sea Hunt Popular American television show aired from 1957 to 1961. It brought diving to the attention of the television viewing public.

Shallow water blackout Underwater unconsciousness usually caused by hyperventilation.

SPG Submersible Pressure Gauge. A gauge that allows the diver to monitor the pressure in his scuba cylinder.

SSI Scuba Schools International, training agency.

Surface-Supplied Commercial diving equipment consisting of a diving helmet that is connected to the surface by hoses and cables that supply the diver with air and power.

T

Tanks See 'Cylinders'

TDI Technical Diving International. A technical diver training agency.

Technical Also known as Tech diving. This is diving outside of recreational limits in terms of depth or time, or using complicated Rebreather equipment.

Trimix A breathing mixture used by technical divers. It usually comprises of Nitrogen, Oxygen and Helium. The percentages of these gasses are blended accordingly to the specific dive plan in an effort to reduce oxygen toxicity and nitrogen narcosis. Trimix is the breathing mix of choice for technical diving, however it is expensive.

Twinset Two scuba cylinders mounted side-by-side and connected by a manifold. A prime example of redundancy as the twinset effectively equips the diver with two separate air sources.

Y

YMCA Young Men's Christian Association. The first organisation to offer a scuba diving certification in America.

Y-Valve A Y-Shaped valve configuration enabling a diver to fit a single cylinder with two regulators, equipping him with another level of redundancy. Now considered out of date with the appearance of the H-Valve.

1. INTRODUCTION

1.1 Background

World famous explorers spanning many ages have navigated the wildest rivers, climbed the tallest mountains, penetrated the deepest jungles and crossed the largest deserts. Man has even sailed the oceans and circumnavigated the globe. However, an enormous portion of the vast depths of the worlds seas remain unexplored, but not without many valiant attempts to expand our ability to survive underwater.

Of all the great technologies which underpin our modern world, underwater intervention - the ability of a human or machine to explore and work below water probably possesses the longest history.

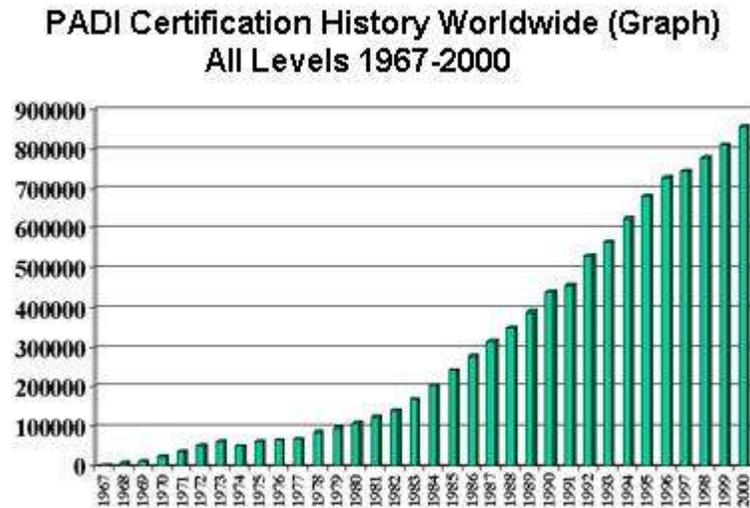
(The Historical Diving Society, Date Unknown)

Diving and mans struggle to survive underwater has an extensive history dating past 500BC. An in depth history and evolution of the diving industry would detail submersibles, breath-hold diving, snorkelling and more. Such a history is worthy of a book alone. As a gentle introduction to diving, a brief history of modern scuba diving can be found in Appendix A and has been written to outline the main events leading to the development of recreational scuba diving as we know it today.

At present, equipment and training has never been cheaper or more readily available, the internet has played a large role in this with many online equipment shops and some training agencies offering new e-learning diving courses. There are at least fifteen major recreational diver training agencies worldwide. Other technical diving agencies offer further, more specialist training. There is no doubt that the diving industry is a big money business, and it does not end there – it is ever increasing in popularity.

Does the buddy system really make recreational scuba diving any safer?

Between 1967 and 2000, PADI International issued 10,151,841 certifications worldwide, making them the world's most popular training agency. Looking at PADI's certification statistics puts diving's growth in popularity in perspective;



*Figure 1.1: PADI Certification History Worldwide
(PADI International Ltd, 2005)*

However, for a single agency to certify so many divers it does raise a major issue in today's diving industry. The issue of whether the quality of training is being compromised for commercial gain. Jablonski (2000) writes;

Making diving more "accessible" is generally synonymous with making it easier, in allowing educators to shorten diver training.

(Jablonski, J. 2000, P.4)

Focussing on the British market, Diver magazine's October 2005 issue featured a recent independent report from the Maritime & Coastguard Agency concluded that the current U.K active diver population is nearly 700,000 strong.

Why is diving such a popular activity? The reasons are numerous; there is the freedom, the feeling of being weightless and able to move freely in three dimensions, the excitement of exploring a whole new world, the adventure, the thrill of risk taking, the endless research possibilities and also the glamour and occasional prestige and status associated with the sport. It seems the single, most common answer as to why people dive is a simple one; because diving is fun. On the other hand, some individuals enjoy solo diving because of the solitude it offers, and the fact that you are truly the master of your own fate.

However, no matter how fun it may be, it also has the potential to be very dangerous. Improper training, recklessness, inadequate or poorly maintained equipment, complacency, over-confidence, diving beyond your ability; any one of these things can lead to death, and that is only just scratching the surface. Worryingly enough, some divers place their faith wholly in their buddy. Through magazine articles, books and internet forum discussions, there appears to be a certain attitude within some divers whereby they falsely believe that they are safe because they have a more experienced buddy to dive with. Their buddy is their mental crutch, and if that crutch is removed they will fall, with possibly fatal consequences; perhaps fatal for both divers. This 'dependant buddy' type of diver is not self-sufficient and could be considered an additional hazard.

1.2 Reasons for study

When reading Diving magazines and periodicals, the reader is often faced with stories of doom and gloom, commonly of a buddy pair either going missing or dieing together. Often these stories go unexplained; this leaves the reader wondering what the cause of the accident could be. Equipment failure is easy to diagnose as long as the bodies are recovered, however, what went on beneath the waves often remains a mystery. Could the buddy system be to blame?

The author also has a personal interest in this matter, having had two near-miss accidents as a result of buddy error. Are divers being trained to a high enough standard, or as Jablonski (2000) highlighted, is quality of training being sacrificed in an effort to churn out more and more divers? If there is any way diver training could be improved to produce safer divers, this research project may hold the key to unlock such answers.

1.3 Aims

What are the advantages and disadvantages of the buddy system and how do they affect diving safety? The intention of this research project is to find the distinct advantages and disadvantages of the buddy system and determine whether or not the buddy system actually makes recreational scuba diving any safer. Beginning this topic, the author has an open-mind, approaching from a somewhat impartial perspective due to limited experience and subsequently unafraid to plunge deeper into this controversial topic. Following the buddy system blindly is without question foolish, as is diving solo without adequate training and equipment. Where do the lines blur? Where are we going wrong? Why is the buddy system the cause of so much debate and discussion within the diving community? Why do so many divers follow it blindly as if it is law?

1.4 Hypothesis

From my previous experiences and observations of the buddy system, the author believes that the results of this research project will highlight that the buddy system does not actually improve safety whilst under the water, but offers substantial safety benefits to the diver on the surface. The author also predicts that many divers will favour the buddy system for the companionship it offers.

2. LITERATURE REVIEW

There are an abundance of books, articles and websites devoted to the many specific subject areas of scuba diving. Examining a variety of these texts offers the reader an opportunity to delve deeper into the inner workings of diving to accumulate a more rounded knowledge of what can be a complicated and much debated topic.

2.1 Diving Manuals

Through looking at adverts and dive centre lists in British diving magazines, it is apparent that the two most popular recreational diving agencies in Britain are PADI and BSAC. A logical start to this literature review is to examine the training manuals from both organisations in order to find out the underlying fundamental attitudes, techniques and skills that new divers are being taught.

The BSAC Diving Manual (1993) has a very detailed section on the buddy system and its associated procedures. As a manual, the text has been written for the sole purpose of teaching the reader how to dive to the BSAC's standards. However, some very interesting points can be found within. The manual defines how BSAC (1993) see the buddy system;

The buddy system is, by definition, a pair of divers operating as a single unit, each being responsible for the other's safety both above and below the water. It is one of the most basic safety precautions in sport diving, based on the premise that it is unlikely that the same problem will occur to both divers at the same time, thus enabling assistance to be given should the need arise.

(British Sub-Aqua Club, 1993, P.120)

Do many divers actually want to be responsible for another person's safety? Probably not, to be responsible for somebody would imply that they are not yet responsible enough to look after themselves. A better wording would be that each diver has a duty to assist the other without endangering himself should problems arise. It is unfair to claim that each diver has a responsibility for the other as it could imply that if one diver does something inherently dangerous, such as penetrating a wreck or cave without the proper equipment or training; then his buddy could be held responsible for his actions and any subsequent consequences.

The manual puts too much emphasis on the buddy system being the solution to all problems; the manual refers to the buddy system as '*the first line of safety*' (1993; P.120). A competent, qualified diver's first line of safety should be his own ability, knowledge and experience and not the ability, knowledge and experience of their diving buddy. This is evidenced in Appendix B, which details an American court case whereby a diver was sued for abandoning his buddy.

The PADI Open Water manual (2002) approaches the buddy system in a different manner. The manual states that the three reasons for the buddy system are practicality, safety and fun. PADI reinforce the idea that the buddy system is not just there as a safety measure, but also to make diving a more social activity. Once more the word 'responsibility' appears in the text, although the context differs to that of the BSAC manual; the PADI manual (2002) states that you have a responsibility to each other, whereas BSAC (1993) write that you are responsible for each other.

The approach taken by PADI seems to emphasise that the buddy system is primarily there to make diving more enjoyable, more relaxed and a little easier. Also written is that the buddy system only works when divers stay together, and that it is necessary to stay with your buddy. This approach is better than that of the BSAC manual (1993); however the BSAC manual (1993) offers superior detail of procedures, skills and usage.

2.2 Diver Down

A more eye-opening way of looking at responsibility between divers is illustrated by Ange (2006). Ange is the Managing Director of the Americas Division of the Professional Scuba Association International. In his book *'Diver Down'*, Ange (2006) writes;

You are responsible for you. When it comes down to it, only you can swim for you, think for you, and save your own life... Never trust anyone else to keep you safe. Take responsibility for your own safety.

(Ange, 2006, P.14)

Why is this approach to diving not included in the training manuals of BSAC and PADI? Self-sufficiency should be a core part of diver training. If a diver can not look after himself he may be more hindrance than help in an emergency situation.

Diver Down was written to draw attention to the many problems one can encounter underwater. Ange's (2006) ethos throughout the text is that prevention is better than cure, and each incident is broken down to a step-by-step account of what went wrong and what should have been done to avoid the incident in the first place. For the purpose of this case study, it is interesting to note that out of twenty incidents, eleven of them involve positive or negative input from the divers buddy.

Learning from the mistakes of others is very wise indeed. All of the incidents in *Diver Down* are true stories. Through studying these stories it is easy to identify the positive and negative points of the buddy system, Ange (2006) often highlights these in a section at the end of each chapter in a section titled 'Strategies for survival'. The book fits into a niche somewhat uncovered by other Diving literature. The dissection of real world incidents offers the reader a chance to learn from the mistakes of others. In identifying the advantages and disadvantages of the buddy system, this text is indispensable.

2.3 Solo Diving

Von Maier (2002) wrote 'Solo Diving: The art of underwater self-sufficiency'. It addresses issues such as why divers choose to dive alone, what is required of a diver to become self-sufficient, and the strengths and weaknesses of the buddy system. Throughout its chapters, the text raises many valid points. It discusses the history of diving and the buddy system. One point made is that divers of yesteryear had to be far hardier than divers of today because of a lack of training, knowledge and often poor quality equipment. Those individuals were the pioneers of recreational diving, a far cry from the easy and commercialised certification courses available today. So going by this theory, divers of today are not as robust or hardy as the divers of old, simply because they do not need to be. It is well known that a lack of physical fitness and mental robustness leads to increased stress levels, and therefore the unfit individual is more likely to panic; panicking divers often end up as dead divers.

The book also examines the techniques and equipment required by self-sufficient divers. All the techniques and equipment choices listed are basic common sense. The majority of the book tells the moderately experienced diver nothing new, it just reiterates and justifies the reasoning behind using a technique or piece of equipment. A large portion of the text contains nothing that could not be learned from the BSAC or PADI manual, it just emphasises its importance.

Von Maier (2002) has included the opinions of various leaders in the field of recreational scuba diving. These opinions may be useful in supporting any findings and would be useful to cross-reference with the experiences of the participants. The text also makes reference to the inadequacies of buddy training present in recreational scuba courses.

2.4 Psychological and Behavioural Aspects of Diving

Nevo and Breitstein (1999) offer a much more academic text. The book '*Psychological and Behavioural Aspects of Diving*' is an in-depth, complex look at the many psychological and physical factors that influence a divers performance and behaviour beneath the waves.

The text offers little in the way of identifying and clarifying the strengths and weaknesses of the buddy system, but it does offer some excellent theoretical background that highlights some of the reasons behind why divers act as they do in certain situations. The text contains some very relevant statistics. On Page 86, Nevo and Breitstein (1999) make use of the 1997 Divers Alert Network (DAN) report to identify statistics that show trends in diving fatalities. Firstly, DAN report that 12% of all the 1997 fatalities involved individuals diving without a buddy, and secondly, it was found that buddy separation was reported in 61% of the fatalities.

Nevo and Breitstein (1999) have successfully accumulated a vast quantity of information, the book is quite disjointed and some chapters read as though they have just compiled a wealth of data with little interpretation. For example, they use a study by Edmonds et al (1983) on diving fatalities in America and Australia in which one point concludes that *'most scuba deaths occurred despite the presence of a buddy'* (Edmunds, et al. 1983; P.81), yet in 1997 the DAN report states that 61% of diving fatalities involved buddy separation. So in a space of 14 years it is plain to see, despite the rather ambiguous use of language in Edmunds' (1983) study (for example, how many is 'most?'), that a lot has changed in basic diver training; there could be a number of explanations behind this. Divers in the 1980's may have had better basic training in that they were rarely separated from their buddies in emergency situations, or it may be that diver rescue training in the 1980's was somewhat ineffective. There is a lot of food for thought within the compiled studies and reports on diver fatalities, and it is somewhat disappointing that whilst Nevo & Breitstein (1999) have identified some relevant statistics, they have neglected to analyse them.

2.5 Doing It Right

Jablonski (2000), the founder and president of American diver training agency Global Underwater Explorers (GUE) wrote the controversial book *'Doing It Right: The Fundamentals of Better Diving'*. The title alone insinuates that many divers are using outdated or totally incorrect procedures, suggesting there is a set way of doing things correctly. The problem with this approach is that procedures and requirements are more rigid than those taught by other agencies, this has both negative and positive points.

On the negative side, the rigidity does not allow the individual to adapt the system to meet his own requirements and may exclude certain groups. However, the system puts a lot of emphasis in reliable equipment choices and configurations, simple and straightforward drills and skills and perhaps most importantly a holistic approach to diving – looking at it as a lifestyle encompassing the need for continuous skills rehearsals, training and personal and group physical and mental development. The DIR (Do It Right) system produces competent, self-sufficient divers and courses are no walk in the park. Perhaps most relevant to this project, is the ‘Doing it Right’ approach to the buddy system.

The DIR system uses a unified team approach. This approach focuses divers on working as part of a well-oiled machine, each individual a cog necessary to help the machine run as smoothly and efficiently as possible – a far cry from the ‘same day, same ocean’ buddy pairs often found on dive boats. Jablonski (2000) writes;

Each member must first be individually capable or they will only burden the buddy team. The adage that a chain is only as strong as the weakest link is very appropriate in this setting.
(Jablonski, 2000, P.40)

This stresses the importance of each team member being totally self-reliant and capable of making the dive alone. Jablonski (2000) states that the team should plan the dive to the capability of the weakest diver. He writes that buddy separation is a common factor in diving accidents and fatalities. The DIR philosophy offers logical progression from typical recreational scuba training and certification.

The DIR systems downfalls are that it asks a lot more of the individual and that will not appeal to the holidaymakers who wish to dive on their holidays once a year. This raises the question of what type of diver is most likely to have an emergency. Those who dive on their holidays a few times a year or anywhere/anytime divers who dive regularly throughout the year? Elliott and Bennett (1993; P.240) write that in any given year, roughly 60% of diving fatalities involve divers with a total of twenty or less completed dives. Therefore, the more experienced the diver and the more rigorous his training, the safer he should be. It is fair to say that the PADI Open Water course is not tough enough to prepare individuals to be self-sufficient down to 18 metres. It is a very basic certification and somewhat misleading as to the skills it bestows divers with. Diving is a dangerous activity and that should be reflected in a strenuous training course. The DIR system offers a lot to the frequent diver and its development of the team system is evidence that in the eyes of some experts, the buddy system as we know it is not working as it should.

2.6 Shadow Divers

Kurson's (2004) bestseller '*Shadow Divers*' is very relevant to this study. The book tells the true story of a group of American wreck divers and their six year quest to identify a mystery U-Boat off the New Jersey coastline. The U-Boat lies in 80 metres of cold water, putting it within reach of only the best technical divers. Therefore, the divers in the book are highly trained and experienced. Why is this important; because the wreck claims the lives of several such divers. By looking at what went wrong with these experienced divers, it is possible to identify flaws in the buddy system.

Steve Feldman died on the wreck, his buddy and another diver risked their lives trying to get him safely to the surface, eventually they had to let go of Feldman as the currents, depth and decompression obligation were overwhelming. The situation then snowballed from one fatality, to potentially five fatalities. Roberts, whom was assisting Feldman's buddy with the rescue attempt, disappeared from the shot line to chase Feldman's body. Feldman's buddy Skibinski ran out of air and panicked, lunging for Brennan and breathing off his reserve air. Brennan passed the panicking Skibinski over to another diver, and he himself descended to search for Roberts. Had it all gone wrong at that point, there could have been five deaths instead of one.

The fault here is that the buddy system is reliant on human beings, not machines. Human beings are emotive, fragile and prone to stress. Had Skibinski reacted coldly without emotion, Feldman would still be dead, but none of the other divers would have been jeopardized. For a human being to leave a friend to a certain death is quite out of the ordinary, a case illustrated many times over in times of war and more recently evidenced by Simpson (1988) and Yates in the book *'Touching the Void'*.

It is exactly this empathy that is the cause of the deaths of father and son buddy team, Chris and Chrissy Rouse several years later. Chrissy was trapped inside the wreck, and subsequently freed by his father; however upon exiting the wreck, the Rouses were disorientated and swam in the wrong direction. This meant that they were unable to find their decompression tanks, which contained vital breathing gas mixes for the decompression stops they would have to make on ascent. It would be impossible to decompress in time using the tanks on their backs, as they were nearly empty.

Understandably, Chrissy panicked. One would assume he panicked through a combination of fear and nitrogen narcosis – as the Rouses were diving on air rather than their usual Trimix. This alone would have a massive impact on their clarity of thought, and as such Chrissy made a rapid ascent to the surface. Seeing this, his father followed. Within hours of surfacing, both divers died of decompression illness due to the massive decompression obligation that they had missed.

These cases, whilst macabre, play an important part in understanding why these accidents happen to divers in a buddy pair. How many divers would risk their lives in the same way for a stranger? These cases are of divers who share an intimate relationship; it is likely that this is not as common in the recreational diving industry as diving with a stranger is. It may be the case that if you are diving with someone you have a relationship with, you are more prepared to risk your life for them, whereby if you are diving with someone you do not know, you are more prepared to put them at risk in your own struggle for survival.

2.7 Diving Magazines and Periodicals

The use of journal articles, magazines and periodicals are also invaluable in any research project. Magazines such as *'Diver'* and *'Sports Diver'* offer monthly news on equipment and training advances, incidents and other developments in the diving industry. They also offer articles on various issues from equipment reviews and selection to skills development and lessons. They also provide a platform for the diving community to voice opinions and discuss issues in letters columns. These magazine articles will prove useful references for this project.

Web-based newsletters and articles such as those found on *Undercurrent.org* (<http://www.undercurrent.org>) are also invaluable, often providing a much more accessible source of information than magazines. *Undercurrent.org* offers a huge vault of articles spanning a vast amount of issues that will be of great use in writing this research project.

2.8 Conclusions

There are many useful texts offering a plethora of information, statistics and personal opinions on the buddy system and solo diving. However, none of these categorically dissect the system and go through the advantages and disadvantages of the system in depth. The opinions and habits of the general diving public also go somewhat unheard, there is no statistical evidence of the diving habits of your average recreational diver and there views, thoughts and experiences of the buddy system. Ange (2006) highlights the value of learning from the experience of others and perhaps it is time to heed not only the thoughts and experiences of very experienced divers and Instructors; those who tend to write the texts: but also pay attention to the opinions of those who have more limited diving experience.

3. METHODOLOGY

3.1 Purpose of investigation

The purpose of investigating the inner workings of the buddy system in recreational diving was primarily to identify the advantages and disadvantages of the system and secondarily, to try and determine whether or not the buddy system increases the overall safety of the individual diver.

3.2 Approach

It would have been very difficult indeed to try and fathom the advantages and disadvantages of using the buddy system through purely quantitative or qualitative research, although both have distinct advantages. Statistical information would be useful to evidence any findings; such statistics are the result of using a quantitative research method as defined by Denzin and Lincoln (1994);

...quantitative studies emphasise the measurement and analysis of casual relationships between variables, not processes. Inquiry is purported to be within a value free framework.

(Denzin & Lincoln, 1994, P.4)

On the other hand, the opinions and experiences of individual divers would offer more depth and perhaps be of more value than a series of numbers or pie charts; the advantages and disadvantages of the buddy system could not be identified by statistical data alone. Thus requiring a qualitative approach, as explained by Denzin and Lincoln (1994);

Qualitative researchers stress the socially constructed nature of reality, the intimate relationship between the researcher and what is studied, and the situational constraints that shape inquiry. Such researchers emphasize the value-laden nature of enquiry.

(Denzin & Lincoln, 1994, P.4)

The importance of using both forms of research in good measure is reflected in the literature review, where many of the texts used relate the experiences and opinions of divers backed up by statistics. That was the way forward for this research project. It would examine the experiences and opinions of others and try to back them up with statistics to evidence certain strong and weak points of the buddy system. A case study is the best way to combine both research methods. Yin (1994: P.8) explains that the case study approach is preferred in examining contemporary events when the relevant behaviours cannot be manipulated. He writes that case studies are particularly strong in being able to deal with a wide variety of different types of evidence. Two of the main sources of evidence of a case study are direct observation and systematic interviewing; aside from these two sources a case study uses many of the same techniques as a history; examining documents and artefacts for example.

The case study model is useful when trying to comprehend and explain rather than generalise. It blends quantitative data with qualitative value, making it easier to support or disprove theories with both types of data, backing one up with the other or highlighting the contrast between the two.

The next problem was deciding what would be the best way to accumulate the desired information.

The most logical choice was in the format of a survey. According to Fink & Kosecoff (1985);

A survey is a method of collecting information from people about their ideas, feelings, plans, beliefs, and social, educational, and financial background. It usually takes the form of questionnaires and interviews... surveys are most appropriate when information should come directly from people.

(Fink & Kosecoff, 1985, P.13)

The questionnaire would have to comprise of several quantitative questions, and a couple of qualitative questions. The quantitative questions would be easy to analyse through use of computer spreadsheet software that can make light work of processing data into numerical values. However, the qualitative questions would be very time consuming and would require much more careful analysis to extract the useful information.

3.3 Sampling

Because diving is a hugely popular sport all across the globe, a suitably sizeable sample would be required. The target sample size was set at 250 responses. 200 of the responses coming from web-based questionnaires and fifty responses from questionnaires handed out personally by the researcher at the National Diving Exhibition. The 200 web-based responses flooded in quickly over the space of a few days. The 50 questionnaires handed out at the dive show were a different matter and only 17 responses were acquired, with much less input in the two qualitative questions than the web-based responses. So the sample was 217 divers.

For the web-based questionnaire, two prominent recreational scuba diving discussion forums were selected. Yorkshire Divers (<http://www.yorkshire-divers.co.uk>) – a busy British based forum with over 4,500 registered members; the majority of whom are British. To make sure the sample was not purely based on British divers, I also posted a hyperlink to the questionnaire on an American based discussion forum, ScubaBoard (<http://www.scubaboard.com>). ScubaBoard claims a much larger membership base of over 52,000; as such it has a much larger variety of nationalities with the majority of the members being American.

Both forums have a wide variety of users at varying levels of training and experience. With a sample size of 200 web-based responses, the aim was to get 100 responses from each forum which, as previously stated, was achieved. So the success rate from the web-based questionnaire was 100%.

The 50 responses from the National Diving Exhibition were a different story and it was considerably more difficult to get the required responses – only 17 were collected. In general, when asked people were not interested, did not have the time, were not actually divers or did not want to fill in the questionnaire. The responses that were collected were hurried and did not contain the same quality of qualitative data that the web-based responses did. The success rate from this method of data collection was a disappointing 34%. The overall success rate from combining the two methods was 86.8%.

Kalton (1983) recognises the importance of sample size and predicting non-response and offers several formulae to calculate required survey size. However, such calculations were unnecessary for the research, as the 217 results were reduced to 100. The 100 responses were divided between the two internet forums and the dive exhibition responses by how long the individual had been diving.

3.4 Methods of data collection

Due to the specialist nature of the investigation, it would have been impractical to use traditional methods such as put together mailings, organise telephone hand out questionnaires in the street or mail them out to random individuals or even conduct interviews, as those individuals probably would not be divers, thus making any research useless.

It also would not have been feasible to go to several dive centres and leave questionnaires for their customers to fill out, as this would only provide a small sample of divers within the local community, between three or four dive centres or clubs. Besides, the timescale for such research would have been horrendously long. The best way to collect data from the selected sample was to use the internet.

The internet is an indispensable tool in the modern researcher's toolbox and results acquired through the internet are just as valid as those physically collected. Jones (1999) explains that the internet '*does not exist in isolation*' (P.XII) and to study it as if it was not connected to the real 'offline' world would be a big mistake. He also writes that none of the limitations of physical presence such as place and identity effect users in 'cyberspace'. The internet was the primary method of data collection, the secondary method would be to attend a diving exhibition and personally hand out a printed form of the online questionnaire.

The internet is a vast resource with a plethora of different uses. By using the internet it was possible to not only access large online communities of divers, but also to distribute the questionnaire and gather results very quickly. By posting a hyperlink to the questionnaire on the internet, and making it accessible to the sample, results should in theory come back in droves. By using this method the participant fills out the questionnaire purely by choice; they do so in their own time, in the location of their choosing, with complete anonymity and they are able to take as long as they like to complete the questionnaire. All this allowed the participants to feel totally at ease in answering the questionnaire.

The use of such a relaxed format was crucial in providing some very in depth qualitative responses that would otherwise not have been possible in the form of anything less than an interview. The success of this approach can be measured in contrast to the limited results gained from the secondary method of data collection.

The primary method of data collection was implemented by using Questionpro (<http://www.questionpro.com>), a web-based software package allowing users to create a questionnaire that participants would be able to respond to by simply clicking on a hyperlink which could be distributed by either email or by posting the hyperlink address on the internet. The programme would then email the results directly to the researchers email inbox, allowing him or her to input the data as it comes in, thus reducing both workload and timescale. The questionnaire was hosted on Questionpro.com servers, and then posted on the two internet discussion forums identified in the sample (Yorkshire Divers and ScubaBoard).

Due to limited access to theoretical framework on conducting web-based research, it was decided that some of the sample would fill in questionnaires vis-à-vis. This was the secondary method of data collection. A paper version of the web-based questionnaire was handed out in person at the National Diving Exhibition with the only difference between the two being the method of delivery; physical rather than digital. Response rate was drastically lower and the target of 50 responses was not possible. Also, the responses to the two qualitative questions seemed very rushed and in some way it seemed that the participants did not want their opinions to be laid bare whilst face to face with the researcher.

Once received, answers from the two Qualitative questions were separated from the Quantitative results and placed in two separate Microsoft Word files for analysis. The Quantitative data was input into a Microsoft Excel Spreadsheet.

3.5 Design

The questionnaire was designed to be as simple as possible combining a series of Quantitative questions with two Qualitative questions. It was piloted on ten members of the public in paper format for fault finding. After ironing out some flaws, the questionnaire was put into electronic format on Questionpro.com and the hyperlink distributed on the two selected web forums.

3.6 Analysis of quantitative data

Quantitative data was compiled on a Microsoft Excel spreadsheet and then the 217 responses were filtered down to 100 responses for ease of data handling. To get a proportionate mix of experience levels, the 100 responses that were analysed were selected by experience levels. The way it was broken down follows:

		How long have you been diving?						Total
		1-2 Years	3-6 Years	7-10 Years	11-15 Years	16-20 Years	21+ Years	
Source	Yorkshire Divers	8	9	7	6	11	5	46
	ScubaBoard	8	8	4	5	5	7	37
	Dive Exhibition	2	1	2	6	1	5	17
	Total	18	18	13	17	17	17	100

Figure 3.1: Break down of selected 100 responses by experience levels

The inequality of the balance of responses is for a number of reasons. Firstly, it was decided that the seventeen results from the Dive Exhibition were still valid, and that all of them should be included in the final sample, as a physical representation of the diving public. This left 83 responses to come from the two internet forums – which shows further unbalance. This is because of the responses received. The original plan was to the 100 responses in proportion to the results received. However, due to the limited responses in some experience brackets, this balance was not achievable. The entire 217 results are presented below:

		How long have you been diving?						Total
		1-2 Years	3-6 Years	7-10 Years	11-15 Years	16-20 Years	21+ Years	
Source	Yorkshire Divers	21	38	7	16	12	6	100
	ScubaBoard	41	28	4	6	5	16	100
	Dive Exhibition	2	1	2	6	1	5	17
	Total	64	67	13	28	18	27	217

Figure 3.2: Break down of total responses by experience level.

Having selected the 100 responses to be analysed, the results were entered into another Microsoft Excel spreadsheet and converted to the charts, pie charts, tables and graphs found in the results section. Cross-tabulation was carried out by manually counting and tabulating the raw data.

3.7 Analysis of qualitative data

The qualitative data was handled from an Interpretivist approach. Miles and Huberman (1994, P.8) state that this approach relies on continued readings of the data and vigilance over one's presuppositions. Two advantages of this approach are that it allows a more practical understanding of meanings and actions, and also recognises that researchers are no more "detached" from their objects of study than are their participants.

Because not all participants chose to express their opinions through the Qualitative questions, it was feasible to analyse all the Qualitative data received. Some comments were irrelevant to the research and were disregarded immediately. Through continuous study, comparison with diving texts and articles and eventually grading the data by relevance, the raw data from Questions 11 and 12 were filtered down to the insightful comments found in Appendices C and D, in an effort to keep the data true to the participants original meaning, spelling, punctuation and grammar in Appendices C and D remain unedited.

3.8 Limitations for study

The main limiting factor in this research project is the timescale. Ideally, a lot more time would be spent gathering data and analysing it. This project would greatly benefit from a much larger sample size, perhaps running into the thousands. The sample size is too small to provide totally accurate results, but given the time constraints and measures taken it should still provide a fair representation.

3.9 Locating the author

Atkinson (1992; P.37) states that each author has his own interpretation of the literature, as well as a personal style and his own relevant personal experience. This means that the author's experiences and knowledge may be invaluable in research, but also that an author may have be biased towards a particular outcome.

In my relatively short diving experience of two years, I have had two near-miss accidents. Both were down to situations where my buddies not only endangered themselves, but also endangered me. So my interest in this particular aspect of diving is in part intrigue as to how many accidents are down to the misuse of the buddy system and my own concern and lack of faith in a system that I was trained to follow without question. I remember when I started diving; I would not have dreamed to go diving without a buddy and was lead that to do so would lead to instant pain, suffering and/or death. In short, to dive without a buddy was to play with fire – it would be only a matter of time before you got burned.

In this project, the author has been careful to remain open-minded and has attempted to write this project with a clear outlook, only calling upon personal experiences to assist with judgement and provide examples. However, as this research partly relies on qualitative data it is difficult to guarantee that the author's personal biases have not unknowingly crept in. The only guarantee made is that the author has done his very best to remain impartial.

4. RESULTS

For ease of reference, results are divided between quantitative, qualitative and cross-tabulated types. Quantitative results span from Question One to Question Ten and are shown within this section in the form of pie charts and graphs to present statistical findings. Qualitative results taken from Questions Eleven and Twelve are available in Appendices C and D and represent the most relevant quotes selected from all collected responses.

4.1 Quantitative Results

Question One provides information on the participants experience levels. The responses to this question do not evidence any findings as they are used as a control. Question One was used to select the 100 participants whose results would be studied. This was done so as not to create an unbalance of experience. This is recorded in Figure 4.1:

		How long have you been diving?						Total
		1-2 Years	3-6 Years	7-10 Years	11-15 Years	16-20 Years	21+ Years	
Source	Yorkshire Divers	8	9	7	6	11	5	46
	ScubaBoard	8	8	4	5	5	7	37
	Dive Exhibition	2	1	2	6	1	5	17
	Total	18	18	13	17	17	17	100

Figure 4.1: Question One, 'How long have you been diving?'

The data in Figure 4.2 shows the different training agencies that the 100 participants have used to gain certifications. This is useful in gauging the popularity of the various courses available to recreational divers.

What agencies have you trained under?							
PADI	BSAC	SSI	SDI/TDI	GUE	IANTD	Other	Total
72	33	10	24	9	13	31	192

Figure 4.2: Question Two, 'What agencies have you trained under?'

Figure 4.3 presents the results of Question Three 'Have you been trained to dive solo?', Question Four 'Have you ever dived solo?' and Question Five 'Would you ever dive solo for pleasure?'. This allows us to see the amount of participants who have completed specialist solo diver training, how many of the participants have dived solo and how many would consider diving solo.

	Question 3	Question 4	Question 5
Yes	9%	62%	63%
No	91%	38%	37%
Total	100%	100%	100%

Figure 4.3: The findings of Questions Three, Four and Five.

Figure 4.4 addresses Question Six 'Who would you dive with?' It elaborates on what the participants look for in a potential buddy and also gives an idea of how divers go about selecting a suitable buddy for a dive; whether they stick to those they know and trust, brave it with an unknown buddy or simply dive alone.

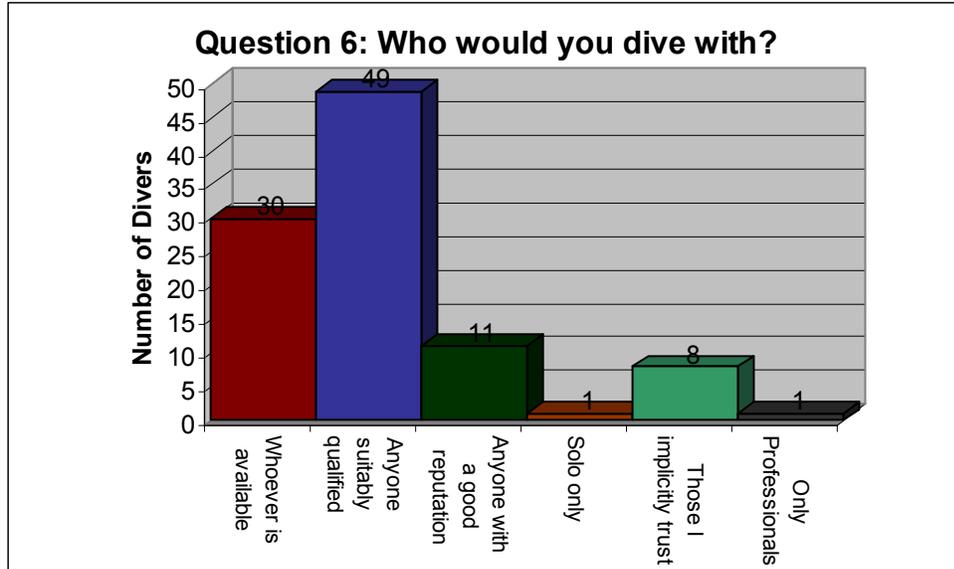


Figure 4.4: Question Six, 'Who would you dive with?'

Figure 4.5 shows how the participants responded to Question Seven 'Have you ever been endangered by a buddies behaviour/actions?' This evidences the percentage of participants who feels that they have been put at risk at the fault of their buddy.

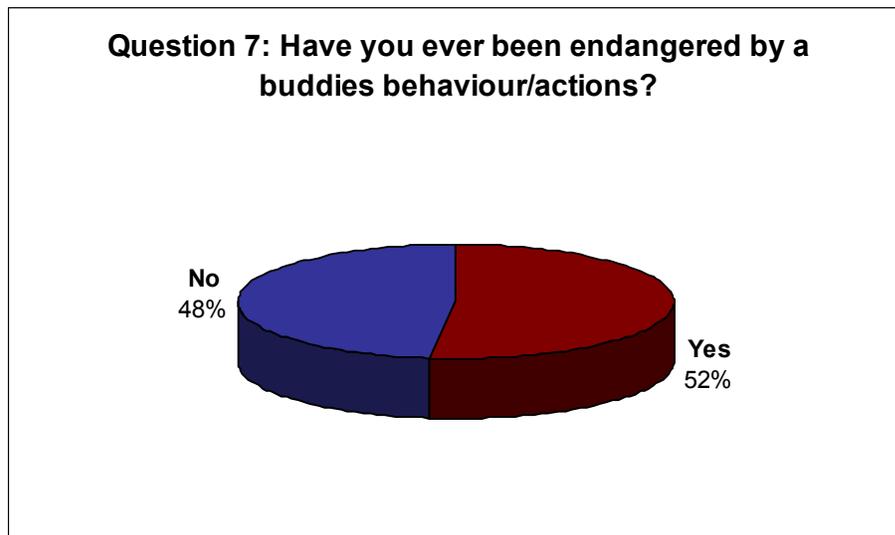


Figure 4.5: Question Seven, 'Have you ever been endangered by a buddies behaviour/actions?'

Figure 4.6 displays the participant's responses to Question Eight 'Have you ever relied on your buddy to assist you in a potentially dangerous situation?' This shows how many of the participants have required assistance from their buddy. The question also shows how many participants were assisted by a diver whom they were not buddied with.

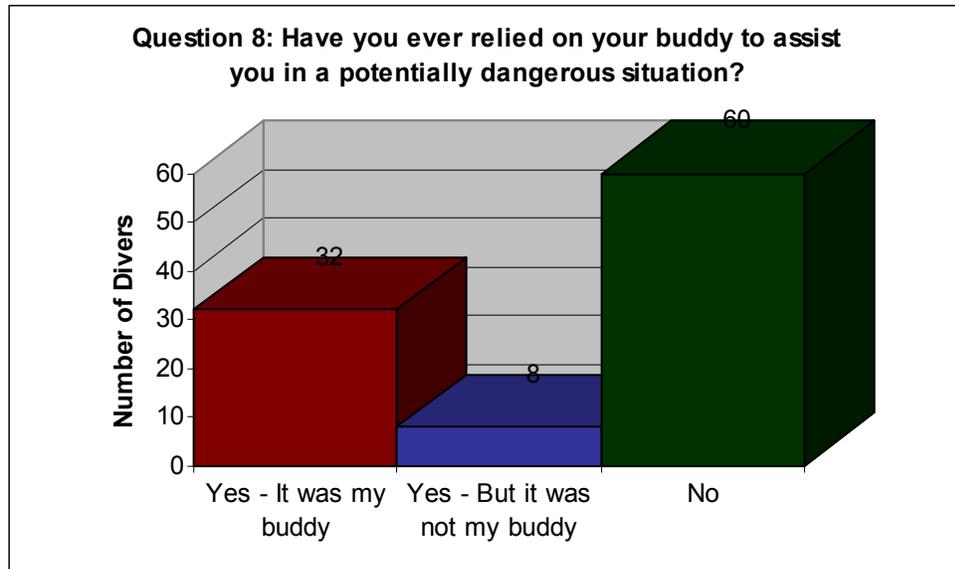


Figure 4.6: Question Eight, 'Have you ever relied on your buddy to assist you in a potentially dangerous situation?'

Figure 4.7 shows how the participants feel about Question 9 'Should solo diving be more widely accepted in the diving community?' This provides some insight into whether the participants feel the skills and training associated with solo diving has a place in the wider diving community.

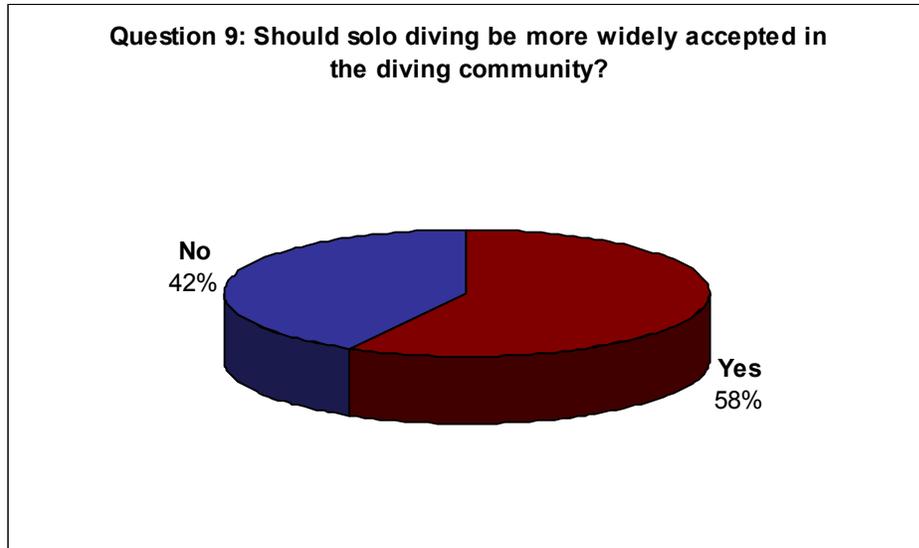


Figure 4.7: Question Nine, 'Should solo diving be more widely accepted in the diving community?'

Figure 4.8 presents the findings of Question Ten 'Have you ever filled in a risk assessment for recreational scuba diving? If yes, did any of the controls rely on having a buddy (Instructors/Divemasters excluded) in the water?' This provides insight into whether or not diving operations include controls reliant on each diver having a buddy in their risk assessments.

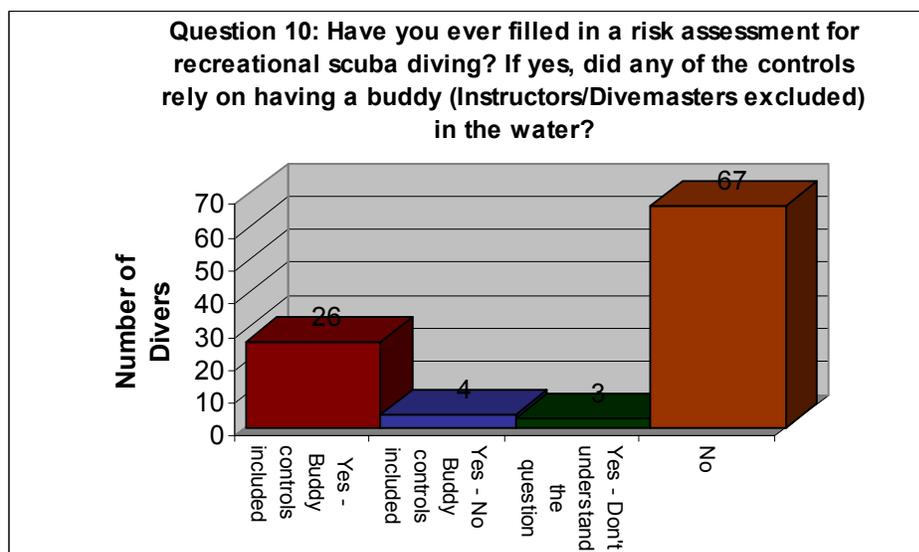


Figure 4.8: Question Ten, 'Have you ever filled in a risk assessment for recreational scuba diving? If yes, did any of the controls rely on having a buddy (Instructors/Divemasters excluded) in the water?'

4.2 Cross-tabulated results

Cross-tabulation is useful in finding simple and interesting results that may not have been anticipated and can only be identified through comparing results from compatible questions side-by-side to find other relevant results.

Figure 4.9 Cross-tabulates Questions One and Six. This shows how the participants experience level affects who they choose to dive with.

		How long have you been diving?						Total
		1-2 Years	3-6 Years	7-10 Years	11-15 Years	16-20 Years	21+ Years	
Who would you dive with?	Solo only	0	0	0	0	1	0	1
	Only those I trust implicitly	2	2	2	0	0	2	8
	Anyone with a good reputation	3	3	1	1	3	0	11
	Anyone suitably qualified and experienced	9	10	5	9	7	9	49
	Only Professionals	0	0	0	0	0	1	1
	Whoever is available	4	3	5	7	6	5	30
Total		18	18	13	17	17	17	100

Figure 4.9: Cross-Tabulation of Questions One and Six.

Figure 4.10 shows the Cross-tabulation of Questions Two and Eight. This evidences how many participants spanning the different training agencies have required assistance from a buddy or a diver that they were not buddied with.

		What agencies have you trained under?							Total
		PADI	BSAC	SSI	SDI/TDI	GUE	IANTD	Other	
Have you ever relied on your buddy to assist you in a potentially dangerous situation? Was it the diver you were buddied with who assisted you?	Yes - It was my buddy	17	16	3	9	4	4	11	64
	Yes - It was not my buddy	7	0	1	0	1	1	1	11
	No	48	17	6	15	4	8	19	117
	Total	72	33	10	24	9	13	31	192

Figure 4.10: Cross-Tabulation of Questions Two and Eight.

Figure 4.11 presents the Cross-Tabulation between Questions Three and Four, showing how many participants have dived solo to those that have been trained to dive solo.

		Have you ever dived solo?		
		Yes	No	Total
Have you been trained to dive solo?	Yes	8	1	9
	No	54	37	91
	Total	62	38	100

Figure 4.11: Cross-Tabulation of Questions Three and Four.

Figure 4.12 displays the Cross-Tabulation between Questions Five and Nine. This shows how participants consider solo diving, or as Von Maier (2002) puts it, the art of self-sufficiency.

		Would you ever dive solo for pleasure?		
		Yes	No	Total
Should solo diving be more widely accepted in the diving community?	Yes	44	14	58
	No	19	23	42
	Total	63	37	100

Figure 4.12: Cross-Tabulation of Questions Five and Nine.

4.3 Qualitative Results

Qualitative results from Questions Eleven and Twelve are presented as Appendices C and D respectively as the layout of the results do not appropriately fit into the main body of text. The two Appendices contain the most relevant responses selected from all responses.

5. DISCUSSION

The aim of this research project was to identify the advantages and disadvantages of the buddy system and how they affect safety during recreational scuba diving. The hypothesis was that the buddy system would be of little benefit below the water, but would aid divers on the surface and also be popular because of the companionship involved. The findings of this project are discussed below, beginning with the advantages and disadvantages of the buddy system.

5.1 Identifiable advantages of using the buddy system

Both solo diving and the buddy system have their advantages and disadvantages. This section discusses and focuses on the identifiable advantages of diving while adhering to the buddy system.

5.1.1 The buddy system, fun and friendships

PADI teach new divers that the buddy system is partly used to make diving fun. A lot of participants in the survey responded that they enjoyed diving in a buddy pair as it made diving much more fun. This was one of the most prevalent lines of comment in the Qualitative results. In Appendix C, ID: SB022 compared diving to owning a motorcycle; fun on your own, but much better with a friend. This reason alone is enough for many divers to choose to dive with a regular buddy, although as evidenced in Figure 4.6, the majority of divers are happy to dive with anyone as long as they are suitably qualified and experienced. Nevo and Breitstein (1999) write that *'the desire to belong to a group of divers is one of the strongest motivators for a diver'* (P.161). They also write that many buddy pairs are “steady”; meaning that they dive together regularly and are committed to each other. This could have been researched if the questionnaire had included a question along the lines of “Do you have a regular diving buddy?” In relation to this, in response to Question 6, *'Who would you*

dive with? 49% of the participants stated they would dive with anybody suitably qualified and experienced; and 30% responded that they would dive with anybody that is available. This is conclusive proof that divers are not exactly stringent in their buddy selection. Only 8% responded that they would only dive with somebody they trust implicitly.

As divers develop friendships, they inevitably also develop a bond of trust as they get to know one another. This can be calming in times of emergency, as a person will always feel more comfortable in a risky scenario if they are with somebody they trust. However, this can work both ways as evidenced in *'Shadow Divers'*, as those who share close personal bonds may find themselves more likely to react from the heart rather than the head, and put themselves at great risk to aid their buddy.

Developing friendships through diving may make diving safer in the respect that the buddy pair will not be an unknown quantity and will be more aware of each other. On the other hand, if divers are diving together simply because it is more fun, would it really have a direct bearing on safety?

The participants who wrote of the buddy system as being a source of fun also wrote of the benefits of sharing experiences. Aside from providing a source of conversation in the pub, the process of sharing experiences also encourages experiential learning.

5.1.2 The buddy system as a learning experience

The importance of the buddy system as a learning experience was highlighted by many participants in the Qualitative research methods either through comments on sharing experiences or identifying the potential the buddy system holds for personal development.

In Appendix C, Participant ID: YD078 identifies that the buddy system allows the individual to pass on skills and knowledge when buddied with less experienced divers, but also to learn and develop knowledge and skills when buddied with more experienced divers. Participant ID: YD094 adds that diving with a more experienced buddy may teach you as much as any Instructor could. This is a major advantage of the buddy system and the strength of this learning process is reinforced by models such as the Action Centred Leadership (ACL) model developed by Adair (1982) and the Learning Cycle by Kolb (1984). Adair's (1982) ACL model is of particular interest, a modified version would allow the more experienced diver in the buddy pair to process the development of the lesser experienced buddy – however, this would certainly require closer scrutiny for ethical reasons as identified by Rea (2000):

Is the facilitator able to encourage groups and individuals to process towards their own ends, and construct their own meanings or is he/she leading and directing the process based on the values and beliefs that he/she wishes the group to adopt?

(Rea, 2000, P.136)

However, ethics aside, the ACL model could be applied to recreational diving like so:



Figure 5.1: Adair's Action Centred Leadership model adapted for suitability for recreational diving use.

This powerful learning style is recognised in a similar manner by PADI. As part of the Divemaster programme, students and Instructors have a mentor-protégé relationship to develop the students to a high standard; in the Divemaster manual, PADI state that this means the instructor acts as a coach, guide, confidant and advisor. It can be assumed that this kind of approach is not used in basic recreational diver training because it would drastically increase the time scale for a diver to become certified, and possibly put many people off learning to dive. So for an organisation like PADI, who are first and foremost a commercial business, offering much more in-depth training would probably lead to a substantial loss of custom from holidaymakers.

If PADI are using such an approach to train their Professionals, it must surely be worth using and perhaps would be worthwhile for Diving Clubs to look at setting up some kind of mentor-protégé system, although for that to work, both parties must be totally willing to work with the system. This form of experiential learning certainly works in favour of the buddy system and would certainly aid in developing safer divers assuming that they are learning from safe divers. On the other hand, it could be potentially disastrous if the mentor diver was to pass on incorrect knowledge and poor, dangerous or outdated skills. As such, the validity and strength of the experiential learning boils down to the quality of training the individual has undergone.

5.1.3 Practicality

The PADI manual lists practicality as one of the reasons for adhering to the buddy system. On the surface this is unquestionable. Diving equipment is cumbersome, restrictive and heavy. This can lead to problems when donning the equipment, as the scuba unit comprising of tank, regulators and BCD can be awkward to put on alone when on a dive boat. Having a buddy to assist with this task minimises risk of injury, and of course, once kitted up the all-important buddy check is carried out to make sure everything is how it should be and nothing has been missed. This is assuming the buddy pair operates together as they are supposed to.

The November 2005 issue of Diver magazine featured a news article on a diver that drowned as he had failed to connect his BCD inflator before entering the water. Neither he nor his buddy spotted this blindingly obvious error (as part of the buddy check, you always check your buoyancy control), had the pair correctly carried out their buddy check, the diver would probably still be alive today. This is clear proof that a major weakness of the buddy system is not the theory behind it, but the involvement of human beings.

5.1.4 Buddies; a back-up to your back-up

There is no denying that the idea of working as a buddy team is fundamentally sound. Two brains are better than one, four hands are better than two and two independent sets (or four if both buddies are diving with twinsets or cylinders equipped with an H or Y Valve) of breathing apparatus are better than one. The concept of diving as a pair is theoretically sound, however as Participant ID: YD009 states in Appendix C;

The buddy system itself is good - however it involves human beings, which is where things usually go wrong...

(Participant ID: YD009, Appendix C)

So the theoretical concept of the buddy system is strong. However, the reliance it places on human beings is where the system falls down, in response to Question Seven, *'Have you ever been endangered by a buddies behaviour/actions?'* 52% of the participants claimed that they had. Whilst this is only just over half of the participants, 52% is a concerning and unexpectedly large portion of the responses.

5.2 Identifiable disadvantages of using the buddy system

On the other hand, the buddy system also suffers from numerous disadvantages. This section will focus and discuss the main issues identified

5.2.1 False buddies

In the author's own experience as an active member and trainee Divemaster at a busy South-coast diving club, members are frequently buddied with individuals of a different experience or competence level. The more capable and experienced members were always buddied with, as Participant ID: YD096 so eloquently put it in Appendix C, 'the worst muppets of that year's intake'. It was common occurrence for competent divers in a regular buddy pair, to be split up and subsequently buddied with the most inexperienced/poorly skilled divers on the boat. The responses to Questions Eleven and Twelve proved that this is indeed common practice all over the world. The buddy system is often exploited at the cost of the more experienced diver.

Halstead (Date Unknown) identifies six types of diver who make diving in a buddy pair more dangerous. These range from the psychologically weak, the dependant diver and the poorly trained diver to the over-ambitious diver, falsely confident diver and the angry diver. Each of these has the potential to turn a simple dive into a catastrophe. What is more concerning is that by using Halstead's explanations of each character; they are easily identifiable on most dive boats. What do you do if the skipper pairs you up with one such character? Do as you are told? Dive solo? Not dive at all? If you choose to dive with the assigned buddy, you may find that you are not diving as a buddy pair at all but merely paying lip service to the concept. Von Maier (2002) identifies this 'same day, same ocean' diving, also recognised as the false buddy syndrome.

A false buddy is very dangerous. For those who feel reliant on a buddy, entering the water with another diver and diving with them may impart a false sense of security. But what happens when the dependant diver finds that his 'buddy' has disappeared? Panic; identified by Undercurrent.org as a major factor in diver deaths. The buddy system acts as a safety net for non self-sufficient divers, and once that net is removed panic takes hold.

5.2.2 A false sense of security

Human beings are pack animals. We work and live in communities and seek the companionship of others. We are raised to believe in safety in numbers. Halstead states;

Fear is the motivation for the buddy system. Divers don't want to drown and they don't want to be eaten. There's nothing strange in this fear; what's strange is the response to it: get a buddy.
(Halstead, Date Unknown)

It is often said that the buddy system imparts a false sense of security on divers. Divers are trained to operate in buddy pairs and therefore this adds a mental crutch for the diver to fall back on, particularly when diving with a more experienced diver. Through the author's experience of recreational diver training, it is evident that new divers are taught very little self-rescue skills and that the importance of the buddy system is drilled into the new diver from the very beginning. So these divers have had extremely limited training in self-sufficiency.

This is particularly concerning when looking at the Quantitative results from the questionnaire; 62% of the participants had dived solo yet only 9% had received training in diving solo. Aside from the Solo Diver certification offered by SDI, the only other form of truly self-sufficient diver training that is readily available is offered by GUE in the form of the DIR system; all GUE divers are taught to be self-sufficient, however they are trained to dive in teams rather than solo, 9% of the participants had received training from GUE. If divers are not trained to be self-sufficient, some may be incapable of looking after themselves; the ever dangerous dependant buddy rears his head again.

5.2.3 Success reliant on diver quality

For the buddy system to be wholly effective, basic diver training needs to be more strenuous. Many experts, including Von Maier (2002) and Jablonski (2000), recognise the importance of physical fitness in divers; yet this plays little part in basic diver training and it seems that many people are oblivious to how important this really is. If one of the buddy team is not fit enough to rescue himself, then what use is he going to be when he has to tow his buddy 200 metres? More stringent medical and fitness requirements may help reduce diver deaths (Undercurrent.org features a lot of articles on health problems and diver deaths), but the negative side of this is that it would be a step backwards for the diving industry; making the sport a much less inclusive activity.

Going back to basic diver training, a typical course teaches the students the very basics; essentially how to swim about underwater with a scuba unit, basic diving theory and core skills such as setting up the equipment, buoyancy control, regulator recovery, mask flooding and equipment removal to name a few. A few pool sessions and open water sessions later and you have a qualified diver. The certification is very basic, does not take long and produces individuals that are able to plan and complete simple dives. It also introduces the diver to a few simple self-rescue and emergency skill sets such as buddy breathing.

Once you have earned your basic certification, you can do all the diving you like, up to your depth limit, anywhere that accepts your certification. For many divers, the only time they will have ever practiced their basic skill sets would have been in their initial training. How many divers would be able to perform each skill on demand, smoothly, with no problems three years after their initial training? Frequent divers may not find this an issue, but those that dive maybe ten times a year or so may have difficulty. If a diver does ten dives a year, for five years it is quite likely that he would be rusty. This could have been researched if the questionnaire had included provisions for questions such as *'How many dives do you make a year?'* or *'What is your total number of logged dives?'* That data could then have been cross-tabulated with the length of time the participant has been diving and also with the questions regarding requiring assistance from a buddy and feeling endangered by a buddies actions.

Undercurrent.org features several articles detailing the training standards of today. It is a common complaint in the diving community that some of the training agencies are offering misleading certifications; to name and shame one such culprit, there is the PADI Advanced Open Water certification. This certification can be completed by anyone who has completed the Open Water certification and comprises of five adventure dives. So it is possible for a diver with less than ten dives under their belt to be certified as 'Advanced'. The Advanced Open Water course itself is an excellent way of introducing divers to the many different types of diving available to them, and is invaluable for building experience, but it certainly does not equip any diver to call themselves 'Advanced'. As a comparison, the equivalent BSAC certification is called 'Sports Diver', a much more appropriate title. As one Undercurrent.org article points out, 'Advanced' is being mistaken for 'experienced'.

With diver training standards becoming more relaxed in an effort to attract more people to the sport, then of course accident rates will rise due to increased numbers of participation and less thorough training standards. Not forgetting that some certifications fall foul of imparting their bearers with a false-sense of confidence. Is this a recipe for disaster? Can the buddy system be relied on as an additional safety measure if new divers are not trained to be skilled, competent and confident?

5.3 Observations

The face of recreational diving is ever changing, DIR principles are becoming more popular, more divers are undergoing technical diver training to further enhance their sport and as evidenced by the results of this research project; solo diving is becoming less taboo and more divers are wanting to participate in diving solo – thus becoming less reliant on the buddy system and more self-sufficient. As evidenced in Figure 4.13, 64% of the participants had dived solo, yet only 8% of those had been trained to dive solo – why? Is this not concerning? The results show that if divers want to dive alone, they will; regardless of whether they are trained in diving solo.

There is a big gap in the market that most of the industry appears to be turning a blind eye to. As illustrated by Figure 4.14, 63% of the participants would dive solo for pleasure, and 58% believe solo diving should be more widely accepted in the community. By offering more certification courses for solo divers, not only will the training agencies benefit from more business, but they might just start producing more self-sufficient divers, less reliant on the buddy system. After all, 60% of the participants responded that they have not needed to rely on their buddy to assist in a potentially dangerous situation and 52% have actually felt endangered by their buddies actions; if this is the case throughout the diving community, then why is the buddy system still enforced as if it is law?

Further to this, different types of diving are suited to different approaches. Activities such as spear fishing are more suited to solo divers whereby there is less chance of the buddy becoming an accidental target. Other types of diving such as deep, technical diving are more suited to a team approach as there is a significantly reduced chance of survival for a solo diver if something goes wrong.

Many of the texts in the Literature Review section have already stated that a more self-sufficient diver is a safer diver. The reason for the buddy system still being enforced on those intending to go solo is simple; liability. The diving agencies and operators want to cover their backs, hence why many divers find themselves filling out scores of forms before diving with an operator. As a former lawyer, Humann (2001) highlights the issue well:

Certification agencies employ teams of lawyers to draft liability waivers that they ardently defend in court. It is also hypocritical: You and I are forced to sign these same documents before we dive with any operator. You bet the training agencies worry about legal liability. Why are they telling you not to?

(Humann, 2001)

An example of this is found in PADI's thoughtfully worded 'Standard Safe Diving Practices Statement of Understanding'; an agreement signed by diving students upon registering with the dive centre of their choosing, and retained as a kind of liability release. It includes the following condition;

5. Adhere to the buddy system throughout every dive. Plan dives – including communications, procedures for reuniting in case of separation and emergency procedures – with my buddy.
(PADI, 2005)

In response to this, Humann (2001) encourages divers to get certified as solo divers, carry a solo diver liability release and generally take responsibility for themselves. The responses to Question 10, 'Have you ever filled in a risk assessment for recreational scuba diving? If yes, did any of the controls rely on having a buddy (Instructors/Divemasters excluded) in the water?' show that dive centres certainly regard a buddy as an extra safety measure; else it would not be factored into their risk assessments. Of the 33 participants that responded that they had filled in a diving risk assessment, 79% responded that their risk assessment had included buddy reliant controls.

A good suggestion for further research to explore the diving industries reliance on the buddy system as an additional safety measure would be to examine diver's insurance policies to see how many require the diver to be diving as part of a buddy pair.

5.4 Summary

In summarising the advantages and disadvantages of the buddy system, a pattern has emerged. All of the advantages of the system stem from the strong theoretical groundings. All of the disadvantages stem from the systems reliance on an unknown quantity; the human being. It is impossible to predict how different people will react in any given situation, and the buddy system is particularly susceptible to this problem.

It is apparent that not all recreational divers are sufficiently trained or mentally conditioned to be of aid in an emergency situation. As quoted in the Introduction to this project, recreational diver training is becoming more accessible to all; and that comes at the cost of making training easier. Making training less demanding does not produce mentally and physically robust divers; divers who are more able to stay calm and focused in emergency situations. The buddy system is theoretically sound, the one consistent factor in all of the disadvantages to the system are non-self-sufficient divers. Therefore, the buddy system itself is not the problem. If the buddy system is to be used as an additional safety measure, the issue that needs addressing is the quality of the training received by divers using the buddy system.

6. CONCLUSION

By examining the quantitative and qualitative results gained from the questionnaire and also the existing information available through the variety of texts, articles and statistics, a number of distinct advantages and disadvantages have been identified; as discussed in the previous section. To conclude, the list of advantages, disadvantages, possible improvements and possible improvements to the research project are detailed here.

6.1 Advantages of the buddy system

To summarise the points raised in the Discussion section, advantages of the buddy system include:

- Adds an extra dimension of fun to diving.
- Makes diving a more social activity.
- Builds bonds and friendships between divers, resulting in buddy pairs that trust each other.
- Provides divers with a means for accelerated experiential learning; the process is accelerated because as a buddy pair participants can learn from their buddies experiences as well as their own.
- More practical on the surface, for example, buddies are able to help each other and check each other over prior to beginning a dive.
- Provides another level of redundancy. A back-up to the divers back-up.

6.2 Disadvantages of the buddy system

As identified in the Discussion section, the disadvantages of the buddy system include:

- Reliance on both divers adhering to the system properly, rather than paying lip service to it; false buddy syndrome.
- Often enforced and followed blindly, without thought. Occasionally taken to be law.
- Provides dependant divers with a crutch, provides some others with a false sense of security.
- Does not actually make diving any safer, as a panicked diver will often endanger his buddy, or a diver will put himself at great risk to help his buddy. Two casualties instead of one.
- Reliance on the quality of the individual diver. An unbalanced buddy pair is dangerous, as the more experienced diver is often more at risk.

6.3 Possible improvements to the system

It would be impossible to improve the buddy system itself, as the theory behind it is already excellent. For the system to be more effective, a number of changes in the diver training industry could be made:

- Teach divers to be self-sufficient first, use of the buddy system should be second to self-sufficiency.
- Offer more solo diving certifications, and ensure that these are readily accepted in diving operations. It should be the individual's choice to either dive solo or dive with a buddy.
- Agencies could offer longer, tougher and more in depth training programmes as an alternative to the short, basic certifications suitable for holidaymakers.
- Basic certifications should require renewal every three years unless a certain number of dives are achieved in that time frame.

6.4 Suggestions for further research

Overall, the research project ran very smoothly and the only thing that was not entirely satisfactory was the questionnaire. However, if one was able to complete the whole project again with hindsight a number of changes to the questionnaire would be made:

- Question wording could have been made less ambiguous.
- In hindsight, some questions were irrelevant and did not prove anything.
- Better, more relevant questions could have been thought up had more time been spent on developing the questions and more extensive piloting of the questionnaire. This would have made some of the points raised in the Discussion section more easy to justify and back-up.
- The questionnaire was deliberately kept brief, a more extensive and in-depth questionnaire would yield more detailed results.
- A dedicated observation of divers working as buddy pairs on dive boats would provide valuable insight into how the buddy system is used or abused in the real world, which is much more valuable than the contents of a textbook.
- An observation of divers in training would also yield interesting results. Studying differences in training at a variety of dive centres in several different countries would provide valuable insight into the reality of diver training.
- To provide more accurate results, the sample size would need to number in the thousands.

6.5 Concluding statement

The research project has been successful in identifying the advantages and disadvantages of the buddy system in recreational diving. However, it is extremely difficult to fully prove whether or not it actually improves recreational scuba diving safety. Arguments have been put forward, results laid bare, opinions voiced and the works of many experienced individuals have been interpreted. However, the definitive ‘yes’ or ‘no’ answer to the initial research question can only come from much more extensive and detailed research than that conducted in this project.

The contents of this research project serve the purpose of providing some further enlightenment on this much debated issue to the individual diver, but can only offer limited guidance. There is sufficient evidence to prove that the buddy system is certainly a factor in diver accidents, and as such does not necessarily make diving any safer, but there is also evidence that shows that some diver deaths and accidents could have been avoided had the buddy system been followed correctly. So to conclude, the author believes that the buddy system has the potential to make diving safer but that potential rests in the hands of each individual diver.

The findings of this project have been presented as impartially as possible, and part of it points to divers becoming more self-sufficient; that means thinking for yourself, so my fellow divers please draw your own conclusions from this project alongside mine. Dive safely.

Andrew P. Coutanche

22nd of March, 2006

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Appendix A: A brief history of modern scuba diving.

1772: Sieur Freminet attempts to make a scuba device out of a barrel. He dies after 20 minutes as he is merely recycling his own oxygen.

1825: William H. James designs a self-contained diving suit with a tank of compressed air strapped around the waist.

1829: Surface supplied diving helmets and leather suits designed and built in England by Charles and John Deane, and Russia by E.K. Gauzen

1835: Siebe develops Standard Diving Dress. The basis of surface-supplied diving dress.

1839: British Army Royal Engineer Divers start work on salvaging the warship HMS Royal George. The Divers worked in buddy pairs – the first recorded use of the buddy system in diving.

1865: Rouquayrol and Denayrouze develop the *aérophore*, the first known demand regulator, although the diver still walked on the seabed rather than swim. The regulator was designed as a bailout due to the limited capacity of the tanks.

1879: Fleuss develops the first Rebreather, designed to rescue mineworkers trapped by water.

1908: Haldane publishes *'The Prevention of Compressed-Air Illness'* in 1908. A study of the causes and symptoms of decompression sickness. The research was so revolutionary that it still forms the basis for modern day Decompression models.

1911: A German company, Draeger, release an oxygen Rebreather.

1912: Haldane publishes decompressions, tested by the U.S. Navy.

1933: The first sport diving club is formed in San Diego. They call themselves 'The Bottom Scratchers'. In France, Yves Le Prieur develops a constant flow open-circuit breathing set.

1937: Commeinhes develops a twin cylinder open-circuit breathing apparatus with a demand regulator. WW2 interrupts development.

1943: Cousteau and Gagnan design and test the first Aqua-Lung. The scuba unit that was to revolutionise diving – the creation of this unit is seen as the invention of modern scuba diving.

1953: The BSAC (British Sub-Aqua Club) is formed.

1957: American television show ‘Sea Hunt’ introduces scuba diving to the television viewers around the world. It runs until 1961.

1959: The YMCA becomes the first nationally organized course for scuba certification in America. CMAS also known as the World Underwater Federation, is founded by Cousteau. Training agencies become en vogue as scuba diving gains public attention.

1960: NAUI (National Association of Underwater Instructors) is formed in America. Diving accidents increase dramatically due to the increased popularity of scuba diving.

1966: PADI (Professional Association of Diving Instructors) is formed and trains 3226 divers in its first year of operation.

1970s: Recreational diving equipment is further developed. Scubapro develop the stabilisation jacket and the forerunner to the dive computer; the decompression meter.

1977: First DEMA (Diving Equipment & Marketing Association) trade show is held.

1980: DAN (Divers Alert Network) is formed as a non-profit organisation to promote safe diving.

1983: The Orca Edge becomes the world’s first commercially available dive computer.

1990s: An estimated 500,000 new scuba divers are certified yearly in America. recreational diving boomed in popularity, as evidenced by PADI’s certification figures. Many new Diving magazines were born, new retailers were formed, new dive centres and live aboard boats were created to cope with the ever-increasing demand and custom provided by the scuba-travel phenomenon.

1994: TDI (Technical Diving International) are formed.

1998: SDI (Scuba Diving International) are formed as the recreational branch of TDI.

Appendix B: ‘Diver sued for abandoning buddy’

Undercurrent.org (2004), a popular website that claims to be the scuba diving community’s most unbiased information source, has a vast number of informative articles. One that stands out in particular is entitled “*Diver sued for abandoning buddy: Is he liable for her death?*”. Considering that the BSAC’s definition of the buddy system includes that the involved divers are responsible for each other, this article looks at the buddy system from the laws perspective. This article details the case and summary of Brendan Yace et al., Plaintiffs and Appellants, v. Dennis Dushane, Defendant and Respondent. Number B162789. (Los Angeles County Superior Court, Number BC272937) December 16th, 2003.

The article states that one of the divers panicked as the other ran out of air. He bolted to the surface, leaving the out of air diver alone; resulting in her death. The deceased’s children filed against her buddy on the grounds of breach of duty of care. The case went to The Superior Court in the County of Los Angeles. The summary findings were that there is no legal duty of care between divers working as a buddy pair and that a panicked response to an underwater emergency is an inherent risk in scuba diving. Dictionary.com (2005) define responsibility as ‘*Something for which one is responsible; a duty, obligation or burden*’. The key word being duty; if a court of law finds that no duty of care exists between divers, then is it really appropriate for misleading definitions of the buddy system to insist upon a responsibility for each other?

Appendix C: Question 11 quotes – “Your thoughts and/or experiences of the buddy system”

ID: YD005 Buddy system should be a partnership arrangement, not the dependency relationship it often is.

ID: YD007 The buddy system is not perfect but that is generally due to the buddies not the principle. Diving with someone else is safer, argue it any way you want and I can come up with a number of situations where a good buddy will keep you alive and you'd die alone. Worst situation I have been in was on a course. While the problems were triggered by the instructor they were none the less genuine. At 34m I had both tanks on my twinset fail, went out of air onto my buddies long hose and then lost my mask. I was unable to inflate my wing, unable to breathe without my buddy and unable to see. My buddy genuinely got me through the deco stops and got me to the surface on schedule. Is that a likely scenario - I hope not! But if it does happen I know that the people I dive with can cope in that level of stress. That's the minimum I want for technical diving. For recreational diving then the standards are lower but I still want someone who is going to be able to assist me if problems occur...

ID: YD009 The buddy system itself is good - however it involves human beings, which is where things usually go wrong...

ID: YD014 Every diver should have his own redundancy to get out of the shit by themselves, a buddy should be backup to the divers backup.

ID: YD029 On balance a good dive is where I come back with my buddy.

ID: YD048 Plan solo, dive with a buddy.

ID: YD055 Good, in context, for the majority of divers, as it brings some backup, assistance and adds to the enjoyment. It is, however, reliant on the buddy being appropriately trained.

ID: YD058 Buddy system works in an environment where all of the divers are trained and experienced in teamwork. Without the commitment to teamwork, it's essentially paying lip service to a concept.

ID: YD065 Diving with someone else inherently must be safer than diving on your own, except in circumstances when your buddy's abilities are so poor that they actually become a liability. That cannot be seen as a criticism of the buddy system, only in the quality of training

ID: YD069 I usually take a camera so am often unaware of my buddy, more so if he has a camera too!

ID: YD070 Whatever its faults, unless you are self-sufficient and reliant, the buddy system is the best for new or inexperienced divers. The danger is that acceptance of solo (diving) by the mainstream will filter down to those unprepared for it. Similar comparisons can be made with tech and DIR philosophies. In the past you might have thought of doing 100 or 200 dives before going tech. Now it's not uncommon to see divers getting twinned a split second after basic courses.

ID: YD072 I was trained to dive with a buddy and feel more comfortable with one. As an instructor I tend to look on my buddy as a liability rather than a potential source of help. In recent years as my diving has become more adventurous I have tended towards self sufficiency, but still feel happier with a buddy. I now dive mostly CC and feel a buddy is essential in case of CO2 bypass.

ID: YD073 I find that having a buddy has made me more aware of my own kit configuration as well as exposing me to new and different ways to do things.

ID: YD074 You have to dive with a GUE three man team to understand how fantastic and stress free the system can be. How would you feel being blind and out of air at 36 metres - knowing that your team will bring you up safely?

ID: YD077 Buddy system is extremely important, and the so called taboos assist in ensuring less experienced people do not dive solo...

ID: YD078 I think that the buddy system is an important part of diving. They provide a backup equipment source if you have gear failure. They are available to assist you in an emergency. Diving with less experienced buddies allow you to pass on skills and knowledge. Diving with more experienced buddies allows you to learn. As long as a buddy has a minimum set of skills and experience I wouldn't consider diving without one. It is more fun diving with a buddy too.

ID: YD092 The disadvantage of the buddy system is that it does not promote self-reliance. I have too often seen divers getting into difficulties over basic drills (e.g. sending up a DSMB) as they have always relied on their buddy to do it in the past, then have a problem if they find themselves separated from their buddy and have to deal with it themselves. However, when buddies are self reliant, these issues disappear. In that case, I enjoy diving with a buddy - help is at hand if it is needed, it is more sociable diving with someone else and it generally makes dives more enjoyable.

ID: YD094 Having a more experienced buddy can teach you almost as much as the instructor. Having lots of different buddy's, you can observe and note worse/better ways to do something.

ID: YD096 Everyone must be responsible for their own redundancy, gas management, etc... As the more experienced people in the club, (we) regularly get the pleasure of diving with the worst muppets that can be found in the year's intake. I view this as a solo dive in terms of managing the risk, although I do really enjoy the enthusiasm people have from seeing their first crab/starfish/wreck/etc

ID: YD098 I think the buddy/team system gives a huge safety advantage when properly implemented. I feel that a properly equipped and trained solo diver may well be safer than a poorly matched/trained buddy pair. In comparison to a properly equipped, trained and skilled buddy team they cannot be at the same level of safety in my view.

ID: SB006 Recreational buddy systems, for the most part, only provide a false sense of security. Buddy awareness and rescue training are usually sorely lacking.

ID: SB011 Too much reliance on a buddy as a person who can bail you out instils a level of complacency in new divers that has proved hazardous. Accident statistics show that most buddy teams end up separating while underwater, resulting in the injury or death of one of the divers. Teaching proper self-reliance in diving is the key to reducing accidents.

ID: SB016 I believe solo diving is far safer. I have had several experiences where panicked 'buddies' were a definite hazard.

ID: SB017 Redundancy is the key to safe diving. A well-trained buddy is a great piece of redundant safety equipment.

ID: SB022 I like the buddy system. Scuba is something that is great to share. It is like owning a motorcycle, sure it is a lot of fun alone, but when you have a friend to do it with, it just makes it much more enjoyable.

ID: SB023 The buddy system is a redundancy to what you have, a back-up to a back-up. There are many scenarios where I'd feel comfortable diving solo and many others where I wouldn't.

ID: SB024 I have been diving for 44 years and began diving solo very early (in the mid- to late-60's. I only began logging dives in June of 2000 though when international dive travel became an interest. Of the 1,300 dives I've logged since then, about 80% of them were solo and I had only one incident.... OOA at 70 ft due to a clogged debris tube in the tank valve. No air coming through any of my safety gear (redundant second stages). It would have been easy to overcome had I worn my pony bottle that day. On the approximately 20% of my dives when with a buddy, I have had a number of incidents where problems my buddy experienced caused me to effect a rescue or take other action. The incident frequency (incidents per dive) has been about 20X higher for diving with a buddy than diving solo.

ID: SB025 Every time you enter the water you are solo diving and one should only do so if they are self-reliant and capable of saving their own arse in the event of an unfortunate occurrence. The

only plausible necessity for having a dive-buddy is underwater black-out, as in all other issues, a competent, prepared diver should be able to handle on his/her own...

ID: SB027 If you choose a buddy that's one thing - having a buddy assigned by a dive operator is another entirely!

ID: SB043 One of the most significant failings of training is the lack of stress on the buddy system. People are expected to dive with a buddy, but they aren't taught how. More people practice same ocean (lake) buddy diving than anything else. This leads to people diving without someone within an appropriate distance to render aid, and they aren't trained or equipped to handle it.

ID: SB045 Diving with a buddy is implicitly safer than not doing so. Attempting to dive buddyless requires a great deal of forethought and comfort with the environment and equipment. I would only do so with significant redundancy (double tanks with isolation manifold) and great confidence in my ability to use it correctly. Even with this training and confidence, I have a little nagging voice in my head every time I do so that says 'you are going to look like such a fool if you have an accident, it will be so irresponsible and unfair to your family.' There is a significant attitude among the Northeast wreck diving community that diving solo is safer - that buddies screw up and get you killed. In technical diving, I would rather dive solo than with a buddy I don't know and trust. Recreational diving is very different, I'm willing to try just about anyone once unless I see them exhibiting an unsafe attitude before the dive, such as not planning, not wanting to discuss details, having an abomination for a gear configuration, grossly out of shape, etc. I haven't had any significant incident with a buddy in the water.

ID: SB048 All too often when I'm solo on a dive boat the crew will try and buddy me up with someone who either does not intend to communicate or highly overstates their experience level.

ID: SB052 It is perfectly fine. Certifying organisations need to teach more about how to be a buddy.

ID: SB056 The buddy system does not work. It fails the average diver. It fails because we do not practice enough with only chosen buddies. We dive with whoever we can.

ID: SB058 The buddy system is as good and reliable as the skills of the buddy. A badly trained/skilled diver as a buddy might make a dive MORE dangerous. A diver needs to consider the capabilities, reliability and accessibility of the buddy when planning and executing the dive.

ID: SB061 I have been paired with unknown dive buddies on various trips on which I did not have a designated buddy. On two of these occasions my impromptu dive buddy had set up their equipment backwards or incorrectly. Proper training and experience is needed whether diving with a buddy or not. Point being, if a person cannot set up their personal gear properly, would they be able to help me in an emergency? Furthermore, are they more likely to endanger me?

ID: SB067 Your buddy is one of your most critical gear choices, they could be a big negative or a big positive. Choose wisely!

ID: SB070 I feel that diving with a unified team approach suits my diving best. Though I do dive with anyone who wants to dive, I tend to make those dives on the easy side in order to judge the other persons ability and to let them be able to judge my ability. If I feel they are not safe or like to crawl on reefs, I will not dive with them again.

ID: SB071 Only the competent should dive. Only the competent should solo dive. Competence can be self-taught. In the early days of scuba, there was no certification. I dived without certification, and occasionally without a buddy. But before I did either, I worked hard to learn all I could, and I progressed cautiously.

ID: SB074 I don't consider solo or buddy diving to be much different as far as safety goes. Unless there is a major problem, I don't dive any differently or use different gear for either dive.

ID: SB076 Buddy system is great, it makes diving a ton easier!

ID: SB077 No buddy = death

ID: SB082 Being a relatively new diver it is very tough to find someone to buddy up with. I need bottom time to work on my techniques, buoyancy, trim etc. Everyone I have met does not need to work on that stuff, so if I want to dive, I have to 'wing it' and tag along with whoever I can. I would consider a shallow (under 20') dive solo, just to work on what I need to be a better diver.

ID: SB085 It only works if the two really stick together. Other than that I do not see the 'must' for it. Too much hype is placed on the requirement for it.

ID: SB088 For the most part, I feel that the buddy system works. However, I think that every diver should be self-sufficient, and not think that nothing could go wrong because I have a buddy.

ID: SB096 Some divers don't want buddies because they feel less experienced divers are unsafe. This ignores that the lesser experienced diver is more safe when buddied up.

ID: DS005 Buddy system is enforced as 1 experienced diver plus 1 less experienced. If anything goes wrong with the experienced diver, he is in fact diving solo (e.g. Instructor and beginner).

ID: DS006 Should be threes, not twos. Know your buddy!

ID: DS015 Competent self-sufficient divers diving together are safe. Unbalanced qualification is unsafe.

Appendix D: Question 12 quotes – “Other relevant comments”

ID: YD011 All the agencies recommend buddy diving, so it must be a good practice. However, if someone wants to dive solo, then as long as they make it as safe as possible for themselves then it should be allowed. Most sites such as Stoney Cove (the sites run as businesses) will not allow solo diving however.

ID: YD067 My only concern is with divers using the buddy system as a crutch to cover poor skills. If you have a buddy pair who each believe that the other is there to save them if it all goes wrong, with no thought on how they can save themselves, are they any better off than two solo divers. Too many rely on a buddy when a little more thought training and practice would serve them better.

ID: YD073 A buddy should be your second line of response, the first being your own redundancy and skills. Ideally you shouldn't have to rely on a buddy, you should really be diving 'solo' but with another 'solo' diver within arms reach. A good diver should be able to extract themselves from most problems without the need of a buddy - they are there to make the dive more enjoyable and for the few times when you can't self-rescue.

ID: YD074 Your options for who do you dive with are not exactly right for me. I will only dive (at a technical level) with other GUE trained divers who I know will take the same approach as me. 30 metre pootles are a bit different and when I'm divemastering I have to dive with whoever.

ID: YD094 I'd have to be totally confident in my kit and skills to solo dive, I don't see it happening for a while yet.

ID: YD099 We have solo everything else (climbing, sailing etc) and it's more or less accepted, even praised in some arenas. Look at the crowds for the Vendee Globe race. I think it's time that the

diving community accepted that solo diving happens and the training agencies put some work into preparing people properly for it.

ID: SB010 If I go on a dive boat where I don't know anybody beforehand, then I'm solo diving, whether the boat assigns me a buddy or not.

ID: SB016 Train people to be self reliant and to equip accordingly.

ID: SB017 Solo diving should not, and realistically can not be banned. Solo divers simply must accept the increased risk.

ID: SB044 Ill prepared buddies are a greater danger to themselves and others than adequately prepared solo divers.

ID: SB046 I enjoy the companionship while diving. Even moreso when as a 'couple'. No real desire to go solo.

ID: SB055 Diving with a recently certified diver is more difficult and possibly more dangerous than diving solo, since you have accepted responsibility for someone who is pretty much completely clueless in the water. That said, I actually enjoy diving with new divers, since everything old is new again.

ID: SB059 As long as my buddy is equal in skill the buddy system is ok by me

ID: SB063 I wasn't even aware it was legal in most places.

ID: SB070 I find most of the 'I come across too many bad buddies, thats why I dive solo' arguments to be poorly thought out reasons and not a valid excuse to dive solo. Most divers who use this argument are basically claiming that they have not found a diver as skilled as they are and should not be subjected to the inconvenience of having to 'take care of some buddy of circumstance.' I think most of the bad buddy stories you hear told form divers are exaggerated cases or inflated egos at play.

ID: SB073 I like the peacefulness of diving alone, with no one to keep an eye on.

Does the buddy system really make recreational scuba diving any safer?

ID: SB084 Odds are 50/50 that any emergency in the water will happen to the other partner. If you are a dependent diver rather than a self sufficient diver, what will happen when dive buddy has an emergency? Now you are faced with the other diver's problem as well as your own lack of comfort.

Does the buddy system really make recreational scuba diving any safer?

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