

less strenuous forms of exercise. Many new sports have been introduced to schools and competitive pressure is on businesses to upgrade their facilities and their approach to the market. Environmental issues are increasingly of concern to Australians.

Scuba diving is uniquely positioned to take advantage of the popularity of environmental issues. Technology has influenced the industry through new equipment and materials. Internal competition is very strong. Store ownership turnover is very high as divers do not necessarily make good businessmen. In the course of the study, the researchers found a degree of suspicion and mistrust amongst some members of the association.

Arthur Young and Company, now Ernst and Young, had some harsh words about professionalism in the industry "Although all the people contacted by the researchers were very friendly, there is undoubtedly a strong current of mistrust among the members of the industry which prevented a few of the major operators from participating. There is an apparent lack of professionalism which needs to be addressed frankly and openly as such attitude will ultimately be detrimental to the individual operator". Overseas the trend is toward customer-service orientation. This is the need to listen and cater to customer needs. The diving industry currently has in place a number of government and industry-enforced regulations regarding safety and the level of instruction.

Australia's economic future is uncertain to many of us, with high interest rates, lowering of the Australian dollar and a decline in the standard of living. The general prognosis is bad. Because the overall effect makes it more expensive to travel overseas, it may mean more dollars will be spent on local leisure activities. However, the initial costs of becoming involved in diving are becoming more expensive.

Response to the study was high in some fields but low in others. 75% of diving business operate from only one outlet and 56.6% are owned by companies. In 1988 49% of the turnover of the average dive shop was from equipment sales and 28% from their scuba school. Retailers' turnover was largest in Queensland then NSW followed by Victoria.

Certification agencies reported an average 16% increase in numbers certified. The largest group of students was aged between 19 and 35 with consistently more males than females. The average cost of an Open Water or Entry Level Course was \$300, exclusive of any equipment hire or purchase which would be required to complete the course. To this must be added the medical and X-ray costs.

It is no wonder that diving instructors are becoming harder to find for the dive schools, as they only earn an average of \$18,564.

It was shown that, consistent with world figures, PADI was Australia's largest training agency with a 51% market share. In 1988 50,550 students were trained as new divers. This figure would mean that approximately \$122,330 was earned, on average, by each dive school from new divers. Some of these would purchase equipment and progress to continuing education courses, adding to the dive shop's income.

The Yellow Pages proved to be the next most popular form of advertising but had the lowest perceived effectiveness, whereas television, the least used medium, was considered the most effective. "Sportdiving in Australia and the South Pacific" was the most popular industry magazine. It was a shock to most people when it was revealed in the survey that the most popular dive travel destination was Queensland, not the Pacific Islands.

Many other facts and figures were gained through the study but they are far too numerous to mention here. The 32 page report of the study was sent to financial DITAA members and is on sale to non-members for \$75.00 a copy.

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DIVING TRENDS IN THE UNITED KINGDOM

Greg Adkisson

Accepting that man is a land, rather than an aquatic animal, man's excursions into the oceans, throughout history, have been limited more by technology than by human physiology. It is only within the last hundred and fifty years or so that technology has begun to outpace us. Today, we are faced with a new breed of diver armed with higher pressure bottles, warmer suits and an array of new equipment designed to allow deeper and longer diving while keeping decompression to a minimum. We know that sport diving groups are changing the way they dive and nowhere is this more evident than in the new BS-AC '88 decompression tables or in the new PADI wheel for multi-level diving. We must be aware of these trends and be knowledgeable in our efforts to express a considered, cautious alternative view.

Historical Analysis

To understand where we are going, it is often helpful to look back and see where we have been. There is an apparent increase in the number of diving accidents over the last few years but of more concern is that the pattern of illness may have changed as well. Studies throughout the years have divided decompression sickness (DCS) into non-serious, Type I (pain only) and serious, Type II (neurological/pulmonary) DCS. Historically, the percentage of serious DCS was stated at around 30%¹⁻³ with Erde and Edmonds' 1975 study⁴ being a notable exception. Different population groups, data interpretation, what constitutes a Type II lesion and differing exposures all make comparisons of these studies difficult. There is clearly, however, a changing pattern of diving and it seems that the amount and pattern of DCS may be changing with it.

Factors Involved In Diving Casualties

What caused this increase is not entirely clear but a number of factors appear to play a role. Divers are going deeper and staying longer with the advent of new and improved equipment including warmer suits, larger air bottles and advanced technology in the form of diving computers and other diving aids. Sports divers regularly venture into depths that the commercial divers are restricted from entering. Decompression stop diving has become routine and new tables, designed to maximize in-water time, have been introduced into widespread use. In 1988, the use of diving computers was involved in 42% of the accidents treated by MOD(N) and the practice of repetitive diving in 63%. Depth in excess of 30 metres accounted for 68% of the accidents with 21% being greater than 40 metres and 12% from depths in excess of 50 metres.

TABLE 1

PERCENTAGE OF CNS INVOLVEMENT IN DIVERS WITH DCS

1963	Rivera	26%
1965	Slark	35%
1969	Kidd and Eklliott	25%
1975	Erde and Edmonds	52%

TABLE 3

FACTORS INVOLVED IN 95 PATIENTS WITH DCS TREATED IN 1988

Dives deeper than 30 msw	68%
Dives deeper than 40 msw	21%
Dives deeper than 50 msw	12%
Repetitive diving	63%
Use of Computers	42%

From 1985 to 1989, the number of sports divers treated or advised by the Ministry of Defence, Navy (MOD(N)) has risen steadily. The most dramatic increase occurred in 1988 when there was a twofold increase in cases treated compared to previous years.⁵ Central nervous system involvement among those divers treated for DCS also rose. It reached a peak in 1988 when 87% of divers treated showed evidence of CNS involvement. The figure was down to 76% in 1989, still a notable increase from past years. I was personally concerned that the divers I treated from '87 to '89 appeared to require more extensive therapy to achieve resolution than in my previous years of experience.

Additional factors, perhaps more traditional, played a role in the 1988 figures. 54% of the divers treated in 1988 were older than 30 and 21% were over the age of 40. Diving at altitude accounted for 6% of the treatments while 5% were associated with flying after diving. Medical conditions which would normally render a diver unfit were associated in 10% of the cases. Whilst not involved in a recompression treatment, the oldest diver I was consulted about was 72 years of age and had just returned from a series of dives in an isolated area of the world without recompression treatment facilities. The oldest diver actually treated was 67 years old.

TABLE 2

SPORTS DIVERS TREATED OR ADVISED BY MOD(N)

	1985	1986	1987	1988	1989
Advice	71	69	82	143	145
Treatment	45	50	51	105	137
% of DCS Cases with CNS Involvement	51	65	68	87	76

Implications For the Future

No longer is diving a sport for a few hearty individuals. Sport diving has become big business with major commercial interests servicing all aspects of the sport; provision of gear, instruction of new divers and the arranging of diving holidays. Diving is expected to grow in popularity and, as the number of divers grow, it is likely that the numbers of diving related injuries will grow as well. Likewise, as the introduction of new and sometimes untested, or minimally tested, diving aids continues, the potential for more diving related injuries will increase. As many of our divers grow older, it is likely, as in the rest of medicine, that greater numbers of older patients will present, often with associated medical problems.

We have been concerned, as a medical community, that a great deal of long term neurological damage may be caused by diving, and that it is not always apparent by our existing test procedures. Whether this subclinical damage affects the patient later in life remains a matter of speculation. What does appear to be certain, is that, as technology advances and divers are urged to go deeper and stay longer, advancing medical technology will allow us to take a more critical look at the effects of this hostile underwater environment on our patients, both young and old.

Diving is a hazardous occupation and a hazardous sport. Few of us expect or desire the sport diving community to stop diving. We hope, however, that, as a community, they will recognize the current limitations of human physiology. When faced with the possibility of a few extra minutes on the bottom or the possibility of reducing decompression by a few minutes they will balance the benefit against the potential cost. That cost, all too often, is high. It may be a lifetime in a wheelchair, a life-altering disability or simply a nagging reminder of an old injury. Whatever the cost, major or minor, it is important for us to remind the diving community that the vast majority of so called "accidents" we see are, in fact, self induced injury that can be avoided with a reasonable degree of caution.

The implications for the working diver may be even greater. As techniques for examining the central nervous system become more sensitive, the question of short and long-term neurological damage will make an even greater impact on the commercial industries. New standards of medical qualification may become necessary. Baseline CNS studies, long term follow up and accident investigations may begin to document hitherto unappreciated neurological changes. If damage is documented, the question becomes whether the small degree of damage seen in some cases has any functional effect, either in the short or the long term health of an individual. These questions will undoubtedly be driven in part by medico-legal and occupational health considerations. The implications for the diving industry are enormous. As man's ability to dive ever deeper

into the oceans develops, so does the appreciation of the dangers he faces. Now, more than ever, reasonable caution must be used whenever man, the land animal, enters the water.

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