

undercurrent®

THE PRIVATE, EXCLUSIVE GUIDE FOR SERIOUS DIVERS

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The Florida Keys, U.S.A.

--Inside And Outside The Park

The Florida Keys, America's own tropical reefs, badly abused from boat anchors, inconsiderate divers and collectors, boat garbage, toxic waste and who knows what else. Nonetheless, as I write this from my houseboat-cum-office in Sausalito, I wish I could be so close to warm-water, coral-reef diving. What great fortune to have the option to go reef diving any weekend of the year!

But fly to the Keys for a full-fledged dive vacation? I wouldn't do it (again) and I don't recommend that you do -- unless you have very special needs. You see, for \$200 airfare from Miami you can reach Grand Cayman -- or any number of Bahama islands -- in little more than an hour, where the diving is better and the prices are about the same. Head to the Keys only if you want to live out of your camper ... if you're visiting Miami and have only a day or two to spare ... if your mother-in-law loans you her condo for a week ... if you're on spring break with a carload of divers ... if you have a writing assignment.

Which is why our correspondent traveled to the Keys -- to cover that 125 mile stretch and, if you've never been there, to give you a diving sampler so you know just what to expect. Here is her springtime report:

C.C., travel editor

One can dive the Keys year round. In the summer the water is hot and flat, but occasional tropical rains can gum up visibility. In the winter, the water can be choppy and chilly -- down to 70° -- and the wind can blow the boats back into port. In between, it's one or another, or a combination thereof. You can write ahead to make reservations, or sit in your motel room and call around. With more than 50 operations running boat dives in the Keys, even in the toughest tourist season you can surely find someone in a 20 mile stretch of road with an extra spot on their boat for tomorrow's dive.

But for the experienced diver, calling ahead is the only way to guarantee that your dives will be better than pedestrian. You see, there are essentially

INSIDE UNDERCURRENT

Select Keys Dive Operations	pg.2
Dolphins Plus, Key Largo	
A Guaranteed Swim With The Dolphins	pg.3
Whistlin' In The Keys	pg.4
The Harvard Report, Part IV	
--Recommendations For Business	
As Usual	pg.6
Whither The Purge Valve Mask?	
--The Case For Resurrection	pg.8
Mel Fisher Shares His Dreams--With All	
Of Us	pg.10
Taking The Risk Of Decompression Sickness	
--Do Sport Divers Do It Better?	pg.10
Free Flow	pg.12

two types of boats operating in the Keys. Most tourists get stuck on the proverbial cattle boats which may hold anywhere from a dozen to four dozen divers. They get sucked in by advertisements like Captain Slate's: "be spoiled on one of our three 40' custom dive boats and by our gracious crew."

A serious diver shouldn't buy into that, because half the divers on these boats are just getting certified or, at best, taking their third ocean dive. And you know what kind of dive sites that will mean. To get what you want, you need to nail down the so-called six packs which take only six divers. Diving will cost you a few bucks more, but you may be just as spoiled by a "gracious crew" and won't have to put up with novice divers and novice sites. (See the accompanying sidebar for a listing of a few of the better big boats and six packs, as selected from the experience of Undercurrent correspondents and readers who have dived the Keys.)

On this latest trip, I began about mid-Keys, stopping at the Motel Tropic Vista, adjacent to the Tavernier Dive Center, at mile marker 90.5. (Mile markers tell you how far you are from Key West and are the easiest way to find a place when you're driving). "How 'bout a dive tomorrow," I asked. "Nobody's goin' out," said the proprietor. "The wind's been blowing for the past week." And so his captain was out of town, he added.

If I were at an isolated dive resort, panic would strike. What? No boat? In the Keys, I just got on the horn first thing next morning and found that Buddy's Dive Shop, at MM 79.5, had space on an all day "safari" or a half day wreck dive, which I took. It would be on the Eagle, a 287 foot vessel which I had dived after it was sunk by a group of dive operators. The wreck was clean, with only a pair of grey angels and a school of circling bait fish. What would two years bring?

In the first place, I learned, more bottom time. On my last trip, I was given 18 minutes by the crew of Lady Cyana, regardless of the depth I reached,

Select Keys Dive Operations

Experienced divers visiting the Keys will be best served by seeking out the so-called six pack boats that haul no more than six divers at a time. Based on our experience, the experience of our readers and information from other sources, these are a few to consider:

Key Largo (Pennekamp): The Quiescence has been their longer than any of them (305/451-244). If it's booked, call the Garden Cove Marina (305/451-9996).

Islamorada: We liked Treasure Divers (305/664-5111), and you may also have good success at the Reef Shop (305/664-4385) or World Down Under (305/664-9312).

Inexperienced or rusty divers will be better off getting their fins wet with the larger, more bureaucratic boats. Generally recommended are:

Key Largo (Pennekamp): Capt'n Slat's Atlantis Dive Center (800/331-3483 or 305/451-1325); American Diving Headquarters (800/634-8464; 305/451-0037); Diver's World (305/451-3200); Ocean Divers (800/451-3483; 305/451-1113).

Islamorada: Buddy's Dive Shop (800/223-4707; 305/664-4707); Holiday Isle Dive Center (800/327-7070; 305/664-4145); Lady Cyana Divers (800/221-8717; 305/664-8717).

Marathon: Hall's Diving Center and Resort (800/331-4255; 305/743-5929); The Diving Site (800/634-3939; 305/289-1021); Tilden's Professional Diving (305/743-5422).

Key West: Key West Pro Dive (305/296-3823).

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Dolphins Plus, Key Largo A Guaranteed Swim With The Dolphins

Too often I've been on dive boats when the captain tells me that last week he stopped his craft so that his customers could frolic with dolphins. That never happens to me. So, I was delighted when I learned of Dolphins Plus in Key Largo, Florida, where a number of dolphins live in the channel between the Atlantic and Pacific and frolic regularly with us humans.

Dolphins Plus conducts research on the interactions between marine mammals and people and for \$25 one may spend ninety minutes as a research subject, which includes hearing a presnorkel lecture, swimming with dolphins, and completing a postswim questionnaire about stress and apprehension -- yours, not the dolphins'. You will hear about how dolphins react to humans, how humans react to them and how to get their attention. *After you enter the water the dolphins will size you up and decide whether to play with you or someone else.* If they sense fear, hostility or aggression, you'll get the cold shoulder. But, if you're relaxed enough to meet the dolphins on their terms, you will have an experience you'll not forget. That goes double for women, for some dolphins are as romantic as Valentino.

After your introduction, the dolphins are asked to give you a ride. They prefer the lightest person first, then females. While I waited, a thirteen-year-old boy got the first ride. When it was my turn, a dolphin swam up and offered his dorsal fin. I grabbed hold, another appeared to share the load, and I got a great ride.

The last thirty minutes the dolphins are free to cavort with whomever they choose. *One seemed to get sadistic pleasure by appearing just in front of my face mask, mouth agape with 88 teeth prominently displayed.* When he got the expected reaction -- flailing, screaming and heart palpitations -- he raced off guffawing. I was told that no person has ever been bitten or intentionally hurt by any of the dolphins. In fact, one or another took my arm in his mouth and held it gently without leaving a mark, almost as if testing my trust. Apparently, I passed the test for more dolphins came to play. When I fired my camera and strobe, they paid their greatest attention,

criss-crossing in front of me and stopping to pose. They brought small rings on their noses and opened their jaws for the camera, seeming to know exactly what I wanted. Even in the 5 foot plus visibility, the creatures were so cooperative I got great closeups.

Curiously, these Atlantic Bottlenose dolphins aren't captive. *Living in a channel open to the ocean, they can leave whenever they wish.* But they choose to stay where they're fed, sheltered and visited every day. Owner Lloyd Borguss does not teach them tricks, feeds them whether or not they give rides and lets them follow their own ideas about interaction. A dolphins-only area is set aside so any dolphin can leave the swimmers any time they want a little privacy from humans.

Researchers from the Florida International University, and the Caribbean Center for Interdisciplinary Research, are conducting this interspecies study. They're also studying the response of autistic children to the dolphins, who seem to be able to relate to these water-bound mammals when they have been unable to form a bond with other humans.

Learning for a diver can be dramatic as well. When I first saw that ten-foot long, 500-pound silver-grey animal swim by, its dorsal fin resembling *Jaws*, my blood was replaced by adrenaline. It took a minute or two before you calm down, and then it became an experience to stay with me forever. My appreciation for the intelligence and sensitivity of these critters -- indeed, all critters -- has reached renewed heights.

To join the fun, mask, snorkel and fins are all that is required. They can be rented or you can use your own. Children, twelve and over, are allowed in the water if accompanied by a parent or guardian. Some divers are allowed and they are segregated from the snorkelers. Wet suits interfere with the dolphins' sonar and aren't allowed. *Advance reservations -- perhaps by several weeks -- are essential.*

For more information contact: Dolphins Plus, Marine Mammal Center, P.O. Box 2728, K Largo, FL 33037; 305/451-1993.

but after Buddy's crew briefed us about the wreck and cautioned us against deep penetration, my buddy and I were left to plan our own profile, with which my Deco Brain helped immensely. The Eagle is slow to fulfill its promise. A thin layer of growth has appeared on the superstructure, a few small schools of jacks circle in midwater and the angels have remained. Perhaps the lousy visibility, which

ran down to 25 feet thanks to the winds, chased the fish away. I doubt it, but even the fishermen were complaining.

We moved to Bean's Reef, a low profile reef maxing out at 60 feet. Fish life was limited, but a large green moray poked its head from beneath a ledge and I had a thrill pursuing a six-foot nurse shark, which wanted little to do with us divers.

With my diving appetite only whetted, I rushed that afternoon to nearby Treasure Divers (MM 85.5). Divemaster Harry Schaefer was very helpful, loading my tanks on board the 26-foot Enterprise while I grabbed a cheeseburger next door. On board, Harry introduced everyone — a couple of regulars as well as a couple of newly certified divers — to everyone else, quickly establishing that his cruise would be amicable and friendly — an advantage of a six pack cruise, even if a tad crowded.

Our first stop was Crocker's Ledge, a coral-covered slope running from 30- to 90-feet. Although the visibility was low, the reef's high profile coated with graceful sea whips and lavender fans made for a pleasant tour. Harry asked for suggestions for the second dive and one of his regulars quickly called for Pleasant Surprise. It turned out to be just that. Before we jumped in, he reviewed the tables for the new divers, then turned to me and said we could wander as far and stay as long as we liked. At 25 feet deep, this low profile reef and its abundant tropicals were as good as any I've seen in the Keys — nothing like Bonaire, but enough to keep me satisfied for an hour.

Next day I mosied down to Key West, to the most southern and western tip of the Keys. Once a picturesque outpost for fishermen and millionaires, today it's loaded with too many T-shirt shops and tourists looking to shake hands with Mel Fisher. A walk through the side streets will still give clue to what attracted Ernest Hemingway and Harry Truman in days past. Key West locals claim to have fine reefs, but if you're a tourist diver, well ... good luck. Since Undercurrent gets complaints about Reef Raiders, I decided to check it out, first hand, calling to reserve two spots on the morning dive boat; after I boarded the boat I learned that a third of the passengers were on their first checkout dive. After a cursory glance at my logbook, I was herded with the others on the bow of the Key West Diver, and in the rain we were quizzed and lectured in a sophomoric fashion, insulting to anyone but a tyro. Underwater at Sambo's reef, stands of elkhorn were abundant and there were several large heads of brain coral, but much other coral was broken or dead and sea fans were ripped to shreds as if this were an underwater war zone attached by ... well ... reef raiders. At two separate

Whistlin' In The Keys

Eugene and Diana Cope began a dive off the Keys town of Marathon last April at 5:15 pm. They told their 15-year-old son Kevin, who was to wait in their private boat, that they would return about 6:15 pm.

When they became overdue from their dive, Kevin tried, but couldn't start the boat, so he radioed that his parents were missing.

A search involving the Coast Guard and private boats got quickly underway, but soon darkness fell and the chances for locating the two divers before morning were very slim.

At 10:45 pm, a local resident heard the faint sound of whistles blowing and carefully followed the noise. He found the two missing divers a mile and a half from where they had started their dive.

Diana Cope later recounted that they had surfaced about 1000 yards from their boat, but were unable to reach it because of strong currents.

The Copes owe their rescue to whistles they carried on their buoyancy compensators. Years ago nearly all B.C.'s came with whistles, but today only Scubapro, Dacor and Tabata include whistles as standard equipment. Most other manufacturers don't include them simply to keep down the price of the basic B.C..

Dime stores and dive shops sell whistles for a buck or two. Every diver ought to have one, especially those who dive privately, at night or anywhere a current might appear.

sites, the coral was covered with fire coral. And, if spiny urchins were once on the brink of disappearing, one would never guess it from here. "On better days," the Captain told me, "the reef is beautiful." Those better days are long past.

One can generally find a dive any night of the week, and I took mine with Tilden's Professional Diving at MM 49.5. They needed three paying passengers aboard their 28 foot Native Son for a night dive on Sombrero Reef. The third didn't show, so my buddy and I split the price. In 25 feet, the finger reef, with mammoth brain coral, was crawling with bugs; although small ones, and plenty of other life. It was a good dive, with a good crew.

Virtually any diver who comes to the Keys seeks out the marine sanctuary of Pennekamp Coral Reef State Park. Here's a chance to see what the reefs of the Keys once were. Captain Corky's Divers World had a spot on the Free Time, heading to Molasses Reef. Tying up to one of the numerous dive boat moorings, the captain warned us not to take anything from the bottom, living or dead, except lobster. The crew from the marine patrol boat over yonder, he noted, had been handing out \$50 tickets to anyone even touching the coral. For your sons and daughters, that's what the future has in store.

Indeed, there is a difference between in park and out of park diving. I saw nothing I hadn't seen before, but there's far more of it -- more hard coral, more soft coral, more fish -- and a hell of a lot more divers. It's quite pretty, similar to the shallow reefs of the Bahamas or the Virgin Islands. Outside Pennekamp, spearfishers have taught the fish to run and hide from humans; inside the park I could get close enough to photograph, say, princess parrotfish, which kept great distances elsewhere. A couple of ornately scrawled filefish hung around the anchor line and several large midnight parrotfish sauntered by. There were schools of grunts, damsels, tangs, and a few angelfish and cowfish. And it's always exciting to dive among squadrons of leg-sized barracuda that hang about here, floating back and forth in the ever so gentle current. Almost all the diving is in water four-feet or less, but, a couple of days here, for the first time ocean diver, the photographer or the easy diver can be quite rewarding. Once it all begins to look the same to you -- and, in a few days it will -- venture down for a dive on the Eagle or simply call a couple of six packs and see where they're headed.

Yes, I do admit enjoying some of Keys' diving, and if I lived there no doubt I would staunchly defend it against reviewers such as myself. I've got a good friend who lives on Long Key and, when he sees what I've written, will call to tell me what a lunkhead I am and that he just got back from a dive after work. What did I do, he will ask, sit in my apartment and fantasize? I'll take his jibe, then remind him that it was only a month ago that he flew to Cayman for a three day weekend and, as I recall, a couple of months before that he flew to the Bahamas for three days. I think he'll get the point.

Divers Compass: To figure out where to stay in the Keys, first call the dive shop to discuss diving, then ask for a recommendation for a hotel, describing your standards; they'll have plenty of recommendations ... Hertz, Avis and others have one-week car rental rates beginning at less than \$100 at the Miami airport; if you rent a car for less than a week, you'll end up with a daily rate that might be as much as \$30 ... Be sure to carry a C-card, and although log books are "required" my buddy had none and was never refused a dive ... For free information about accommodations, etc., call 1-800-FLA-KEYS.

Undercurrent editors welcome comments, suggestions, resort/travel reports and manuscripts from readers of Undercurrent.

Editorial offices: P.O. Box 1658, Sausalito, CA 94965.

The Harvard Report, Part IV

--Recommendations For Business As Usual

In the past three issues we have been carrying the so-called Harvard Report, a report on the scuba industry prepared by graduate students at the Harvard Business School. Although the report was prepared for the Diving Equipment Manufacturers, it refused to distribute it after reviewing the contents. *Undercurrent* believes it should get wide circulation. Here is the fourth in the series.

★ ★ ★ ★ ★

Business as Usual

The scuba diving industry possesses many of the classic characteristics of a maturing industry:

- The real rate of growth over the last six years is estimated at 0 percent.

- The industry lacks the new products and technological developments to attract new customers and fuel industry growth. Although dive computers and digital displays on gauges have been introduced, none is substantial enough to generate significant market growth. There is increased reliance on minor design changes and most products are in the later stages of the product life cycle and are becoming commodity products.

- U.S. manufacturers have looked to foreign markets, while growth in the U.S. has slowed as foreign competitors have entered the market.

- Although the industry was once dominated by three major players who could shape industry events, (Dacor, Scubapro and U.S. Divers) these companies' importance has eroded. Fragmented industries have many competitors who have a generally weak bargaining position with suppliers and buyers. Marginal profitability can result.

Although in a mature industry one might expect consolidation, quite the opposite is taking place. A proliferation of foreign manufacturers compounds the fragmentation. The market share of U.S. manufacturers, especially in rubber goods, has eroded, leading to overcapacity of U.S. manufacturers, increased "cherry picking" of products by retailers and dramatic price discounting by retailers.

So far the competition has been limited to rubber goods. A key question is whether the foreign manufacturers will be able to penetrate the market for hard goods in the U.S.

Predictions for "Business As Usual" Scenario

In the business as usual scenario, we believe that the U.S. manufacturers will lose a significant market

share to foreign competitors over the next several years.

The most vulnerable area is rubber goods. Although there are design innovations each year which distinguish certain masks, snorkels and fins, these designs are usually copied within twelve months. Brand-name manufacturers are losing share to lower priced foreign unbranded products.

We believe that the foreign competitors will make significant inroads in the life support equipment business within five years if the U.S. manufacturers do not act to protect their business. Regulators, gauges and BCs involve machine tooling, plastic injection, assembly, sewing and testing. All of these processes can be readily undertaken by the Japanese and Taiwanese, and probably at a lower cost.

We believe that the quality of foreign products will be high, so given the poor financial condition of many retailers, it is not unreasonable to assume that they would purchase foreign hard goods if it would benefit their bottom line. Foreign manufacturers will have to provide comparable product literature, repair seminars, advertising, warranties, return policies and insurance.

"We believe that the foreign competitors will make significant inroads in the life support equipment business within five years if the U.S. manufacturers do not act to protect their business."

Retailers' loyalty to U.S. manufacturers will continue to erode as they search for better gross margin and import quality improves. Since most foreign firms insist on cash on delivery, if a retailer goes out of business the U.S. manufacturers will suffer if they have extended credit to the bankrupt business.

Obsolete inventory may become more of a problem. Last year's purple fins will not match this year's new color. Manufacturers will have to rely more than ever on cheaper foreign sources while retaining the flexibility to respond to market changes.

Some companies will retail an inaccurate or outdated perception of their competitive strengths and weaknesses, relying on a strategy that was appropriate during the growth stage of the industry, but is no longer viable.

An example of this may come from firms that found it appropriate to have a full product line when the market was growing when it was important to gain market share at the expense of profit. But, in a low-growth market, the same strategy can erode com-

pany profitability and yield market share to more focused competitors. Those companies trying to be all things to all customers will be unable to match the quality or the value of focused competitors.

Eventually the weakest U.S. diving equipment manufacturers will not remain in business. To survive they must: develop strategic focus; develop sources for low-cost products and parts; respond quickly to market changes; differentiate their products through technology or design and build retailer loyalty through service and support.

By taking action now, U.S. manufacturers can retard the progress of foreign competition, maintain their market presence and possibly increase the size of the diving equipment market.

Survival:

Before the U.S. industry can grow, it must survive. U.S. manufacturers must protect their positions before promoting growth. Otherwise, DEMA and the industry members may find themselves promoting growth to the benefit of foreign competition.

Although our survival recommendations are general, each company must individually evaluate its strengths and weaknesses to design a strategy for survival. The companies that will be most successful will pursue one of three clearly defined strategies and not straddle over all the others.

Premium Service: In this strategy a manufacturer distinguishes itself by manufacturing quality products and providing outstanding service and support to its retailers. This depends on creating a strong company image backed by superior sales efforts.

Specialty Products: The manufacturer is an innovator and entrepreneur. The company distinguishes itself by providing products which are at the cutting edge of technology or design.

Low Cost: In this strategy the manufacturer becomes a low-cost manufacturer in focused product markets, primarily commodity products. Currently the foreign manufacturers have the cost advantage. U.S. companies which pursue this strategy would probably resemble trading companies.

Recommendations for Premium Service Manufacturers

The goal is to achieve geographic exclusivity with a strong group of retailers. By granting exclusivity to a retailer, a company with quality products and good advertising should create loyal retailers who will carry fewer lines of equipment and will be less likely to discount since the store will be the only one in the area carrying the brand. The retailer should be able to maintain a better gross margin and, in return, spend more money on growth and recruiting new students. As the business grows, the manufacturer will benefit from more volume and profit. The great-

est risk of this strategy is that high fixed-cost marketing systems are necessary. As a result, this strategy is dependent upon achieving high margins and adequate volume.

Carefully executed equipment testing should be emphasized to the retailer and consumer. Research and development teams should strive to increase the safety of life support equipment and attempt to establish patents wherever possible. High product quality is a key element of success.

If a company sells its products to discount mail order houses, it cannot expect retailer loyalty in return. The retailer will be focused to cut prices, will have little money to recruit new students and business will suffer. If a manufacturer seeks short-term gains in volume through mail order, he may be decreasing his long-term returns.

Older divers may have brand loyalty, but new divers seldom have preconceived ideas about what they want. If the real influencing factor is the dive store owner or instructor, the manufacturer should best benefit from concentrating on satisfying the retailers.

"By granting exclusivity to a retailer, a company with quality products and good advertising should create loyal retailers who will carry fewer lines of equipment and will be less likely to discount since the store will be the only one in the area carrying the brand."

Prompt delivery, availability of spare parts, professional return policies and insurance are all examples of standard services a company should provide to the retailer and consumer.

Recommendations for Specialty Product Manufacturers

A competitor who follows this strategy must have superior research and development staffs which work closely with manufacturing in order to perfect new products at the lowest cost possible. They must be able to react quickly to trends in the market and use advertising to create demand for its products. Patents are critical to the success of this strategy, along with using manufacturing processes that are not easily duplicable. And, testing to prove performance specifications is key to helping the sales of a product.

A company that concentrates its resources on a few products should manufacture products which outperform those products by a full line manufacturer. Superior products backed by advertising should create demand among divers. Consequently, retailers will be receptive to carrying these products. Although volume may not be significant, the profit margin earned on these products should be high. Consumers

are generally willing to pay a premium price for a truly premium product.

Recommendations for the Low-Cost Producer

To pursue this strategy, a company must have the lowest manufacturing costs. This cost advantage can be passed on to the retailer and ultimately the consumer. This creates more sales which, in turn, increases the company's production volume.

The low-cost manufacturer should provide the absolute minimum amount of service to retailers in order to contain overhead. This company is interested in as broad a distribution as possible and for as little expense as possible. A natural channel of distribution for the low-cost producer is mail order.

Predictions for "Survival" Recommendations

If these recommendations are followed, we believe that the U.S. manufacturers will be able to defend

their share of the life support equipment market, but will lose the rubber goods to more efficient foreign producers. Short-term profits and cash flow will be moderate and there will be low to negative growth in revenues, depending on the company's current mix of hard and soft goods.

The manufacturers who design and implement internally consistent strategies will survive. Those who do not follow a focused strategy will eventually lose share and profits.

These recommendations for survival should help the U.S. manufacturers focus on the problems in the industry and give them ideas for designing and implementing strategic plans. The outcome of following these recommendations should be a more stable and cohesive industry which can fight to retail both the U.S. manufacturer's market share and profitability and the retailer's margins. Profits and cash flow should be strong for the best U.S. competitors.

(Next issue: How the industry can grow.)

Whither The Purge Valve Mask?

A decade ago, it seemed like half the masks hanging in dive shops had purge valves. Today, some dive shops don't carry a single mask with a purge valve.

What? You began diving last year and don't know what a purge valve is? Well, it's a circular piece of flexible material fitted in the nose of the mask which allows water to be blown out when one exhales. Otherwise it remains sealed.

Purge valve masks are disappearing, because, the manufacturers tell us, divers no longer desire them.

Vern Peterson, Dacor production manager, says that "masks with purge valves account for less than 10% of our sales." John Hayes, sales manager at Oceanic, says, "we don't get more than four or five requests for purge valve masks in a year." Nick Icorn of Ocean Dynamics says that "no manufacturer is carrying a new purge valve mask. All the designs are at least five years old and most are older than that." And, Tekna has never offered a mask with a purge valve.

There are really two reasons for the disappearance of the purge valve mask: a changing market and problems with the valve itself.

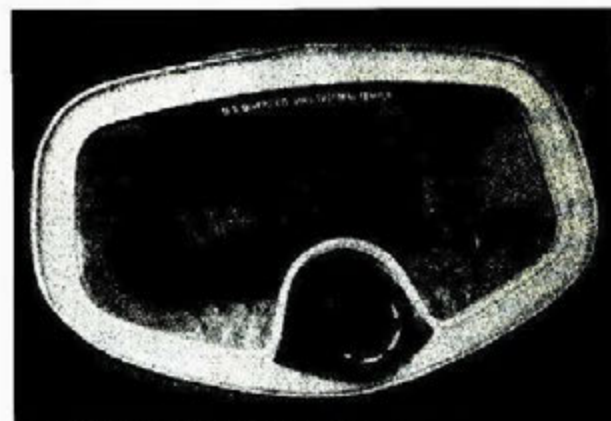
A decade ago, scuba masks were much larger. Low volume masks were used almost exclusively for free diving where they were functional. Today, the low volume mask dominates the market. These smaller, lighter masks don't have enough room for a properly working purge valve.

But, to Sal Zamities, owner of the Bamboo Reef in San Francisco, "it isn't a question of high or low

--The Case For Resurrection

volume, it is reducing the things that can go wrong. Only two things can go wrong with a mask. The strap can break or the purge valve can fail. If you get rid of the valve, then only one thing can go wrong."

Although one might assume that if instructors taught about purge valve masks a lot more new divers might buy them; in most cases instruction begins after a diver buys a mask. Most divers-to-be are told to come to class the first night with their fins, masks and snorkel in hand. So, what they purchase is pretty much left up to what the dive shop owner himself likes and decides to stock. At the Bamboo Reef and hundreds of other stores, the purge valve mask gets



U.S. DIVER'S PURGE VALVE MASK

little play among new divers.

Shall we now celebrate the demise of the purge valve?

At least one expert doesn't believe so. He is Al Pierce, the author of *Scuba Life Saving*, who has, for as long as we can remember, been a major proponent for safe diving. Pierce has had a number of innovative ideas for safe diving, and now he wants to keep the purge valve as an available option for divers. Here are his arguments.

* * * * *

Divers should be at home in the water. One of the main ways to be at ease is to have formed the habit of always exhaling some air through your nose. This keeps water from entering while swimming.

With a purge valve mask, you can easily continue this habit during scuba diving and snorkeling. Constant nose exhalations will keep your mask clear all the time so no extra effort is required.

Few new masks today have purge valves and those that do have small valves that just don't work as well as the larger valves of a decade ago; they take too long to clear. Perhaps this is why purge valves are not popular. Those who have tried the new masks are not satisfied because they don't clear as easily as they should.

Easy Cleaning

The larger the purge valve, the easier it is to clear. It won't be necessary to hold the mask to your face, and it will clear much quicker.

To clear through a large purge valve, all you need to do is look down and exhale through your nose. Since divers normally are looking down, even this step is eliminated.

Clearing a mask without a purge valve is much more difficult. You have to look up, and in doing so (if you haven't formed the nose exhaling habit), you are liable to experience the uncomfortable feeling of water entering your nose (or worse, suffer a laryngeal spasm).

You also have to press the top of the mask with your hand during the purging process. If you use too much or too little pressure, or press in the wrong spot or if you don't tilt your head back far enough, the water will not be eliminated. If both hands are occupied with other tasks, clearing a purgeless mask becomes a logistic problem.

Although some masks can still be cleared by turning the head to the side, that type is fast disappearing. Most masks now have double flanges to make a better seal. This effectively makes it almost impossible to clear by turning to the side.

The elimination of the purge valve is a trend counter to the emphasis nowadays to do everything possible to make diving easy for the beginner -- one of the most difficult tasks of beginner divers is the clearing of a flooded purgeless mask.

A mask without a purge valve can hinder the rescue of a diver since you need both hands to aid a diver in trouble. If there is any one time that a mask is likely to leak, it is when it is bumped by a struggling victim. Releasing a panicky victim and using one hand to clear your leaky mask during a rescue can be risky. Using a purge valve, you can clear your mask easily while continuing to hold the victim securely with both hands.

One of the main objections I have heard against purge valve masks is that they may leak. I have been diving and snorkeling for over twenty-five years and have had only two purge valve failures. In one, a part of the valve flange pushed through its guard and caused a leak. I was able to fix it easily by poking the flange back through the guard with a stick, and continue diving.

On another occasion, the entire valve assembly of my mask came off as I tumbled into the water. But, I continued diving, keeping my face aimed down, inhaling from scuba easily. (As all divers should, I have formed a strongly ingrained habit of never inhaling through the nose when on the ground or in the water.) Once exhaling through my nose was facilitated, there was no resistance whatsoever.

If your purge valve leaks during a dive, remain calm. Just exhale through your nose and keep your face aimed so that the valve opening is at the bottom of your mask. For comfort, block the opening as you inhale. Then make a normal ascent. You probably will be able to fix it easily while on top. More likely, a part of the valve flange has protruded through the housing. A gentle nudge with a pencil or pen will re-seal it properly.

Another objection to purge valve masks that I have heard is that with many models the nose cannot be pinched while clearing the ears. It is not necessary to pinch the nose. All you have to do is cover the valve assembly with your palm and press the mask against your face. This effectively blocks nose exhalation, so clearing your ears is easy.

Can Technology Respond?

With today's technology, some companies cannot produce a near-perfect purge valve mask with the latest double seal flanges. I have no doubt that when younger divers see how easy a large valve is to clear, they will buy purge valve masks eagerly. Divers shouldn't have to drop what they are holding and go through contortions to get rid of a little water.

Certification agencies should consider omitting the requirement that *all* divers learn how to clear a purgeless mask. Beginning divers will find it much easier to clear purge valve masks. We have made diving a lot easier in many other ways. Why not eliminate one of the main roadblocks that frustrates

so many beginners -- clearing a purgeless mask? That skill can be reserved for advanced divers or those who choose to learn it.

Before a student purchases a mask, he ought to be instructed in class about the pros and cons of the purge valve mask and allowed to try rental masks. He ought to have the choice of choosing one over the other.

And if you have never used a purge valve mask you ought to try one -- with the largest valve you can find. Then see how easy it is to exhale through your nose

and keep your mask free of water the no-hands way!

Having to use one and sometimes two hands to clear a mask is an anachronism in modern scuba diving. Clearing a mask ought to be simple and easy -- which is precisely what a large purge valve permits. The resurgence of the purge valve mask will not only enhance safe diving, but also will keep many beginners in the sport who would otherwise drop out. Will not one manufacturer or one training agency exercise a little leadership and bring the purge valve mask into the 1980s?

Taking The Risk Of Decompression Sickness

--Do Sport Divers Do It Better?

Decompression techniques for sport divers are based on theories which may not be valid. In fact, these theories differ throughout the world, and are often as mythical as they are factual. Indeed, the true incidences of DCS in sport divers may never be known. Yet for diving to be safe, decompression sickness (DCS) or bends must be prevented.

Introduction

In the United States, there are more sport divers than all others (i.e., commercial, military, scientific) combined. Sport divers are a more heterogeneous group than most other categories, with highly variable levels of training, experience, expertise, physical characteristics and medical conditions, as well as highly variable diving habits, patterns and methods. Some combinations of these variables may result in certain sport divers being at greater risk than others for developing DCS.

Despite these observations, available data suggests that for sport divers in general, the incidence of DCS is no greater than, or may even be substantially less than, that experienced by U.S. Navy divers operating in the same depth range.

Estimates of Sport Divers Statistics:

The number of new divers certified each year is between 150,000 and 300,000. The National Underwater Accident Data Center (NUADC) states that between 1960 and 1982, the major U.S. certification agencies trained a total of 5.25 million divers.

They also estimate that 46.7% to 49.5% of all divers trained since 1960 dive three (is three times per year equal to three dives per years?) or more times per year -- giving an active population of 2.45 to 2.6 million sport divers, making between 7.35 million and 23.4 million dives per year.

Another source of information used to estimate the number of sport dives comes from *Skin Diver*

Mel Fisher Shares His Dream --With All Of Us

Not satisfied to lay back after discovering the biggest treasure ever, Mel Fisher is at it again. This time he's got you and me in mind.

You see, he's investing a piece of his share of the \$400 million treasure from the wreck of the *Atocha de Senora*, in one of the most innovative ventures for divers one could possibly imagine.

In the waters surrounding Barbuda, in the windward Caribbean islands, more than 100 American, British, French and Portuguese ships have wrecked and, no doubt, there is quite a bit of loot undiscovered.

Fisher, who has had his share of treasure hunting, is beginning construction on 659 acres of a resort for tourists wanting to dive for the ancient treasure. Says Fisher, "we're going to let everyone have a go at it."

Plans call for a luxury hotel, condominiums, an underwater restaurant, an underwater power plant, a medical research lab and an underwater sea life farm.

You can look forward to two years of great media hype and an opening sometime in 1989.

Magazine's 1983 statistics derived from questionnaires sent to a sample of 2,000 of the 159,000 paid subscribers. These divers reported they had been diving an average of 4.7 years, that they dived 15 days a year, and made 2.1 dives per day, for an average of 31+ dives per year.

If one were to extrapolate from the 2,000 sample to the full 159,000 *Skin Diver* subscriber list, then the survey would indicate that there are at least 103,445 active divers in the U.S. (compared to NUADC's estimated 2.45 to 2.60 million). Of course, the unknown is what percentage of all active divers sub-

scribe to SDM.

From those who responded to the survey, 47% had traveled outside of the U.S. to dive at least once in the previous year; 8.7% (or 4,391) of them had traveled at least once to Bonaire. This would give an average weekly number of divers visiting Bonaire of 84.4, which agrees fairly well with information I know about the four Bonaire dive operations in 1983. Obviously, this is by no means a rigorous verification and may be off by a factor of as much as two.

Using the SDM figures to obtain a total number of sport dives made per year (15 dive days, with 2.1 tanks per day) we get 3,258,517 dives made annually. Using the SDM and NUADC data. We have a range of 3.3 and 23.4 million sport dives performed in a single year. Somewhere in this range exists a real value.

Cases of Decompression Sickness in Sport Divers:

Between 1979 and 1983, an average of 387 cases of DCS per year were treated in the hyperbaric chambers in the U.S. and Canada. There was no indication as to whether the divers were commercial or sport divers, so if we were to assume that only half the cases were commercial divers, that would leave 775 sport diver cases. We might equally assume that only 10% of the cases were treated. That would mean 3870 DCS cases in the U.S.

Incidence of DCS in the U.S. Navy and Sport Diver Estimates

There are two DCS incidence rates available from U.S. Navy data. In 1971 17,266 Navy scuba dives were made, and there were six "accidents". Let's assume that all six were DCS, leaving an incidence of 0.035%. Applying this to the estimated number of sport dives made per year, we could expect between 1155 and 8190 cases of DCS in sport divers yearly. If these numbers are true, then, with a maximum number of treated cases being only 387, the range of unreported and untreated cases would be between 67% and 95%.

In another U.S. Navy report covering an eight-year period, there were 13 cases of DCS out of 930 no-decompression dives made from 40 to 140 feet -- an incidence of 1.4%. These 930 dives were the "at risk" dives and were only 7.8% of the total dives made by the Navy. If sport divers in the depth range between 40 and 140 feet dive in the same way as U.S. Navy divers, then 7.8% of the dives would be considered "at-risk", with a 1.4% incidence. That suggests between 3,604 and 25,553 cases of DCS would occur in sport divers annually. With a maximum number of 387 treated cases per year, the range of unreported and untreated cases would be between 89% and 98.5%.

Conclusions

While it might be conceivable that only one-third of the cases of DCS in sport divers are treated, it is unbelievable that the proportion could be as low as one-tenth. Because the high end of this range is based on numbers of divers and exposures that may be grossly underestimated, the alternative conclusion is that sport diver DCS incidence is lower than that encountered in the U.S. Navy.

Another conclusion is that if the incidence is lower, then fewer sport divers make "at-risk" dives than the U.S. Navy divers. The alternative explanation for a lower incidence would be that the population is more resistant, which is absurd.

Sport Divers Do It Better!

This conclusion, while based on shaky data, is nevertheless believed to be valid considering how sport divers are trained how to dive.

Certification agencies and conscious instructors have always stressed the conservative use of the U.S. Navy tables, including the Navy's own recommendation to count total bottom time as if it were spent at maximum depth for establishing decompression requirements and no-decompression limits.

It also includes that almost universal admonishment used in training: "Don't push the limits!" More recently, more conservative no-decompression limits have been promulgated and are being taught and used along with the recommendation that "safety stops" be used at the end of no-decompression dives. These may well add to the conclusion that "sport divers do it better."

The nature of a large percentage of sport divers, i.e., the way they dive, is also conservative. Spending a minimal time at maximum depth and more time at the shallow end in order to insure an adequate air supply for the dive, particularly practiced among the less experienced diver, is obviously less risky.

Recent Trends -- What Impact?

Multilevel Diving

This procedure involves using the Navy dive tables to extend bottom time on no-decompression dives beyond the single depth limits used in the total bottom time at maximum depth procedures. The concept is not only logical, it is within the mathematical parameters used to construct the Navy tables. Furthermore, it has been applied for years in commercial diving and, recently, a method of multilevel use of the tables was tested and accepted in the U.S. Navy. Also, a fair number of sport divers have been using the technique for a number of years.

When used conservatively, the technique may

carry no greater risk than the maximum depth/total time approach. It certainly has not been tested in any specific way, so firm conclusions regarding the safety of the method cannot be drawn. There are, however, fairly sound reasons to believe that a gradual step-wise ascent is safer than an abrupt ascent.

Decompression Devices

If, on single dives to a fixed depth, a diver-carried electronic decompression device gives the diver a more conservative limit than the U.S. Navy tables, it can be assumed to carry less risk of DCS. However, such devices are really made to provide decompression status for single dives which vary in depth (i.e., multilevel) and for doing such dive repetitively. Here, the impact of using these devices is unknown. Using the same mathematics used to calculate the tables and using more conservative parameters for limits may allow such devices to be employed with no greater risk of DCS -- but again, without scientific testing, we are still dealing with an unknown.

Repetitive Multi-Day Diving

While there are no published limits to the number of repetitive dives that can be made in a given day or days, such dive practices may be outside the original design of the Navy tables. The Navy tables were never intended to cover the repetitive dives conducted by many sport divers. The Navy's experience with their own repetitive tables is extremely limited. As increasing numbers of sport divers travel to resorts or live aboard boats and make three or more dives per day over several days, they are far exceeding tests conducted by the Navy.

Although there is no firm evidence that this type of diving, when individual dives are conducted conservatively, increases the risk of DCS, there are sus-

picious. Since there is no hard data either way, another look at some earlier numbers might prove useful.

Using the SDM figures for Bonaire and assuming it might be off by a factor of two, between 55,692 and 111,384 multi-day repetitive dives were, which would predict between 6.5 and 40.3 treated cases of DCS in sport divers annually from the population diving at Bonaire. In the six years that I have visited Bonaire, even the lower of these two numbers has never revealed itself.

A Few Final Words on Risk

Nothing can be done without risk. If we want to dive for sport, we can approach the subject of DCS in terms of a risk spectrum.

The low end risk level -- .035% -- seems to cover just about everything we are now doing as sport divers including multi-day repetitive diving. Whether it includes the use of multilevel dive procedures or electronic decompression devices remains to be seen.

If your diving procedures, or the use of multilevel procedures or devices is equivalent to making dives the same as or equivalent to what was defined as "at-risk" dives of the U.S. Navy, then your risk increases dramatically to 1.4%.

Studies not previously mentioned in this article, have indicated that dives made *precisely* to the no-decompression limits produce an incidence of DCS of from 5% to 8%.

Finally, exceeding the Navy limits would obviously carry an even greater risk. Within this range of risk, at least to a great degree, the choice is yours!

The author of this article, Bruce Bassett, Ph.D., is the president of Human Underwater Biology, which trains physicians and other professionals in the medicine and physiology of scuba diving. Undercurrent takes all responsibility for editorial changes.



There's a new record for cave diving. In February, Bill Gavin and Bill Main swam 7,685 feet -- nearly a mile and half -- into a cave system at Manatee Springs, Florida. Gavin says that "I'm almost never bored in a cave. You don't get 7,000 feet into a cave and worry about something back at the office. At every turn there is the potential of having something totally new revealed to you. When you're in a cave that no one has ever been in there's that feeling of anticipation, wondering what's around the next corner. You never know. No one has ever seen it beforeI don't ever feel that I'm not coming back. I think about finishing the dive and going home and having a beer." Gavin and Main spent the day before the dive setting tanks at various points along the first 7,000 feet. The day after they entered the cave again to remove the tanks. The record breaking dive took six hours.