

The Allure of the Deep

by Bob Bailey

Many divers, especially newer divers, develop a fascination for how deep they can go. I can recall that, as a new diver, I couldn't wait to "notch" my first 100-foot dive. Over the years, I've observed that it's fairly common for divers who are just starting to get comfortable with their underwater skills to push depth limits as a way of challenging themselves, or simply to satisfy a curiosity about what's down there.

Fortunately, most dives go without a problem and everyone has a great time. But sometimes things don't go as planned, and a diver will find out the hard way that they are not well prepared to deal with problems that can become magnified by increased depth. The most common mistake is that the diver does not realize how quickly they'll go through their air supply, and they either run out of or low on air at depth. And tragically, sometimes this results in a diver fatality. But there are other things a deep diver needs to consider, and not all of them are adequately covered in a diver's training.

Looking back on my own experiences, I can see that my early decisions to go deep were not always good ones, because I was unaware of the risks I was taking at the time. In hindsight, I was just lucky, and it's never a good idea to rely on luck to get you through your dive safely.

So I'd like to discuss some of the risks of deep diving, and describe how someone contemplating doing deeper dives can better prepare to deal with them.

Am I Ready for Deep Diving?

So how does a diver know when they are ready to give it a try? Taking a class can certainly help you determine that, but the sad fact is that most divers experience their first deep dive in their Advanced Open Water class, and most AOW classes are structured to let you experience a deep dive without actually teaching you how to prepare for one on your own. Furthermore, since a lot of dive shops and agencies encourage students to go from OW to AOW as quickly as possible, a diver may not be as comfortable with their basic skills as they should be before attempting a deeper dive. And so while it is an exciting experience under the supervision of an instructor, many divers come out of their first deep dive ill-prepared to plan and execute a deep dive on their own.

First and foremost, you need to understand the risks. For that reason, the bulk of this article is dedicated to discussing what those risks are, and giving you some idea of how to prepare for dealing with them.

You need adequate buoyancy control. Failure to recognize and compensate for buoyancy issues at depth can quickly turn a minor issue into a major problem. For example, failure to anticipate the need to vent excess air from your drysuit or BCD may lead to a dangerous buoyant ascent, because as you begin to ascend the air in your suit expands, and it can reach a point where you cannot dump it out as fast as it is expanding. Therefore the ability to anticipate and stay on top of your buoyancy becomes increasingly important as you go deeper.

You need to be reasonably comfortable with your basic skills and with basic safety protocols. A lack of confidence in your skills, or discomfort in dealing with minor problems such as a leaky mask can lead to anxiety and an uncontrollable urge to bolt for the surface. You should be very comfortable clearing your mask, recovering a regulator, and sharing air with your buddy ... at a minimum ... before going on that first deep dive.

And you should have reasonably good buddy skills. Separating from your dive buddy at 100 feet is far more serious than a similar separation at 40 feet. Making a safe ascent to the surface from that depth will take several minutes ... and if you spend those minutes worrying about what happened to your dive buddy they can be some of the most anxiety-filled moments of your life.

If you are unsure of your basic skills, then you are not ready for deep diving and you should get more experience on shallower dives before attempting it.

The Risks of Deep Diving

Not everyone should consider deep diving. There are some factors that everyone contemplating deeper dives should consider. Among these are:

- ***Emotional stability*** – divers who are prone to anxiety or who tend to get emotional when faced with stress are at higher risk of diving accidents. On a deep dive, these divers are a danger to themselves and to their dive buddies.
- ***Age*** – predisposition to decompression sickness increases as we age, usually due to reduced circulation efficiency or increased body fat. This can be offset by physical conditioning, proper dive preparation and good diving technique.
- ***Fitness and health*** – divers in poor health or who are physically out of shape will have a greater risk of diving-related illness than a fit or healthy diver. Deeper dives put greater stresses on our body, making good health and reasonable fitness increasingly important.
- ***Obesity*** – fat absorbs nitrogen faster than muscle, and will hold a lot more nitrogen in solution than muscle. For this reason, especially on deeper dives, the obese diver needs more time to off-gas than a healthy diver.
- ***Medications and drugs*** – if you are taking drugs, especially on a long-term basis, it is advisable to seek the advice of a medical professional prior to any diving. This is especially important when contemplating deeper dives.
- ***Patent foramen ovale (PFO)*** – a PFO is a defect between the chambers in the heart that allows some blood to flow directly from the right atrium to the left atrium. Divers with this defect (about 5% of the overall population) run a higher risk of suffering severe symptoms of decompression sickness. Deeper dives increase these risks significantly.
- ***Smoking*** – smoking impairs lung function, reducing the efficiency with which the alveoli can exchange gas with the blood, increasing carbon-dioxide buildup during the dive. Smoking also constricts blood vessels, which can impair circulation and contribute to high blood pressure.

But there are other risk factors to consider ... among these are:

- Inadequate gas supply
- Increased carbon-dioxide levels

- Increased nitrogen levels
- Increased oxygen levels
- Issues leading to stress
- Equipment-related issues

Each of these risk factors becomes more prevalent as we go deeper, and a significant part of any deep dive plan should include considering how you would deal with the impacts they might have on your dive.

Gas Planning

I cannot emphasize enough that the most important thing any deep diver needs to consider is taking enough breathing gas for the dive. This means the diver should know, at a minimum, what their typical air consumption rate is, how depth and stress factors affect their consumption rate, and how to calculate the amount of gas they can expect to use for the dive they plan to do. Rather than go into that here, I will point you to another article on this web site called “Gas Management”. It describes the key components of gas management, which any diver needs to know in order to plan a deep dive properly.

Carbon Dioxide

Carbon dioxide (CO₂) is a natural by-product of our body using the oxygen we breathe. It is the carbon dioxide building up in our body that triggers our brain to take another breath ... bringing in fresh oxygen as we inhale and expelling carbon dioxide as we exhale. Our body is designed to function with carbon dioxide levels within a certain range. But when we dive, the pressurized gas we breathe accelerates the production of carbon dioxide, and the deeper we go the faster that carbon dioxide production occurs. If we allow it to build up too quickly, or to too high a level, we will end up with a suffocating feeling ... like we can't get enough air through our regulator. For the diver who is unaware of the cause, or unprepared to deal with the consequence, this can quickly lead to a potentially dangerous panic cycle that will most likely result in a too-rapid ascent to the surface. Therefore it is important to control the CO₂ levels in our body by breathing properly and by minimizing our physical exertion ... and therefore reducing the production of CO₂ ... during the deeper part of the dive.

For a diver experiencing carbon dioxide buildup, the best thing to do is relax ... grab ahold of something if possible to better relax your muscles ... and breathe deeply and slowly to reduce the CO₂ levels in your body. Within a few breaths you will start to feel better. Resist the urge to breathe rapidly, as that will not allow a good exchange of the incoming air for the CO₂ you want to get rid of by exhaling.

Nitrogen

Breathing compressed gas increases the uptake of nitrogen into our body. About four-fifths of what we breathe is nitrogen, and because the gas we are breathing becomes increasingly pressurized with depth, the deeper we go the more nitrogen we take in with each breath. This can lead to two significant maladies that a diver needs to consider whenever contemplating a deep dive – decompression sickness (DCS) and nitrogen narcosis.

Decompression Sickness (DCS)

Although we hear much about DCS in dive training, very little is actually known about the mechanics of what causes it. Because of this, those who study the problem have developed mathematical “models” that we can use to simulate its effects. These models have been used to develop dive tables and dive computers that (if you use them properly) can help greatly reduce the risk of getting DCS.

What we fully understand is that DCS is caused primarily by a diver ascending too quickly, resulting in your body trying to get rid of excessive amounts of nitrogen more quickly than it’s designed to handle. We know that the deeper we dive, the more amounts of nitrogen our body will absorb, and as we ascend that excessive nitrogen will get flushed out of our tissues and into our bloodstream, which will carry it to our lungs where it can be expelled through breathing. If we come up too fast, our lungs cannot expel it fast enough, and it can cause problems. For this reason, the deeper we go the more important it becomes to control our ascent rate and make the appropriate safety stops.

Nitrogen Narcosis

Nitrogen narcosis is also due to an excessive buildup of nitrogen in our body. The symptoms of nitrogen narcosis are similar in some ways to alcohol intoxication in that it impairs our ability to concentrate, to perceive what’s going on around us, and to respond to problems that we might encounter. And although the symptoms will vary from diver to diver, the primary risk of narcosis is that it can lead to poor decision-making and/or stress.

The good news is that narcosis is easily managed ... all you have to do is ascend a few feet to reduce the symptoms to a more manageable level.

Oxygen

Oxygen is what sustains us, and makes our body function. But on deeper dives ... even at recreational depths ... it is possible to get too much of a good thing. For the recreational diver breathing air, this is not a concern. But a growing number of recreational divers are using enriched air nitrox to reduce the level of nitrogen in their breathing gas, and this imposes its own limitations. Our bodies are designed to handle oxygen within certain limits, and breathing a compressed nitrox mixture makes it possible to exceed those limits. Therefore we must always make certain that the gas we are breathing is appropriate for the depths we plan to dive. This is why a diver who wants to use nitrox for recreational scuba diving should always take training in how to use it properly.

Stress

Stress is never our friend underwater, but when diving deep the problems created by stress can become magnified. Divers will often develop a feeling of isolation as they go deeper, creating a “tunnel vision” effect that can inhibit your ability to recognize or respond appropriately to problems. This problem can be complicated by narcosis as the diver goes deeper. Depth also reduces light and colors, depriving you of senses you rely on to help keep track of what’s going on around you. As we go deeper, the limitations imposed by depth on our bottom time and air supply can also lead to stress if not managed properly. And for divers who are pushing their boundaries, a simple and very

human sense of the unknown can be a significant source of stress. Unless you deal with stress promptly, it will build to a point where even a minor issue can lead to anxiety, and ultimately to panic ... and on a deep dive, panic is often fatal. Therefore it is important to recognize when stress is building up inside of you and channel it in a positive direction. Most problems associated with stress are self-induced, and the best way to resolve them is by focusing on familiar, easily manageable tasks such as reading your gauges or communicating with your dive buddy. If you begin to recognize symptoms of stress on a deep dive, slow down, breathe deeply and slowly, think about the source of the stress, and take steps to resolve the problem unemotionally. Be aware that your stress is telling you that you are outside of your comfort zone, and act to put yourself back within it.

On deep dives, the source of stress can often begin before the dive ever occurs, so you need to be aware of how you are feeling before the dive and about the dive. Never allow yourself to get sucked into doing a dive you don't feel comfortable about.

Equipment

Most new divers purchase their first set of gear based on economic concerns. And while that gear may be perfectly adequate for shallower, less demanding dives, it may not be appropriate for deep dives. As we go deeper, the ambient pressure of the water around us ... and the correspondingly greater density of the gas we breathe ... puts greater demands on the equipment we are using. Increased compression on our exposure gear can make us feel colder, or even lead to hypothermia. A regulator that performs adequately at shallower depths may not be adequate for delivering the denser gas we will be breathing at deeper depths. And the deeper we go the faster we will use up the air inside our cylinder, so we need to consider using larger cylinders for deeper dives. Adapting to additional equipment for deeper dives may cause discomfort if we are unfamiliar with it, so it is important to make sure we are completely comfortable with our gear before taking it on a deep dive.

Managing the Dive

Managing a deep dive begins with a good dive plan. You should start by asking yourself why you want to go deep in the first place, as this will set the tone for the type of dive plan you come up with. The dive plan should meet your objectives while staying within no-decompression limits. Since going deeper means you will be using your gas supply more quickly, you **MUST** assure you have adequate breathing gas for the dive, plus sufficient reserves to deal with any issues you or your dive buddy may encounter. For these reasons, proper gas management is a key component of any deep dive plan.

Deep divers must use appropriate quality gear, and should maintain their equipment at a high level of working order. The deeper you go, the more dependent you become on your gear for life support.

Deep diving should not be attempted without proper training and equipment. Hazards that may appear minor or easily resolved at shallower depths can become more difficult to manage because of the effects of increased pressure, narcosis, or simply because you are so much further from the relative safety of the surface.

During the dive, there are other things you should do:

Monitor your SPG and no-decompression limits frequently and allow plenty of time and gas to make a properly managed ascent.

Maintain good contact and communication with your dive buddy.

Watch out for the effects of narcosis, both in yourself and your dive buddy, and ascend a few feet if the effects start to induce stress or impair your ability to think straight.

Stick to your dive plan.

Ascend slowly and make appropriate stops.

A properly managed deep dive can be rewarding and fun. Conversely, approaching a deep dive too casually can easily lead to a type of excitement you would prefer to avoid, or in some cases, it can end tragically for the diver who wasn't prepared to deal with the risks imposed by depth.