

Beginners luck

by Mark Mumford

Dear Marge,

I took my first two rolls of film underwater last week, and they turned out looking awful, just bright blue and blotchy. The man at my dive shop says that to get any decent results, I would need to spend thousands on special cameras, and that the one I've got can't handle. Where can I advertise a nearly-new camera?

Yours, Marvin

Unfortunately, there are too many Marvins in the world. Marvin wanted to try his hand at underwater photography, so went out and bought a basic but competent underwater camera. He didn't spend a lot of money, as he wasn't sure how he would get on and, after his first holiday abroad with it, he now wants to sell it.

Is Marvin the Frank Spencer of underwater photography? Does he have to have "Left" and "Right" written on his fins? I don't think so. Marvin has just fallen foul of one of the classic traps of underwater photography.

However, to understand this trap, we need to understand a little bit about photography, especially underwater, so pay attention - I'll be asking questions later!

Light and Water

Unlike air, water is a very dense medium, and while your wineglass of Perrier water may look perfectly transparent (apart from the bubbles), water does absorb light quite quickly with depth. Each colour in the white light spectrum is absorbed by filtration to a different degree by water (See figure 1) and it is essential that you understand that this applies equally well to a horizontal body of water (See figure 2) as well as a vertical body (or column). Absorption is proportional to the amount of water the light passes through. It is not related to the depth, or consequently the pressure of the water.

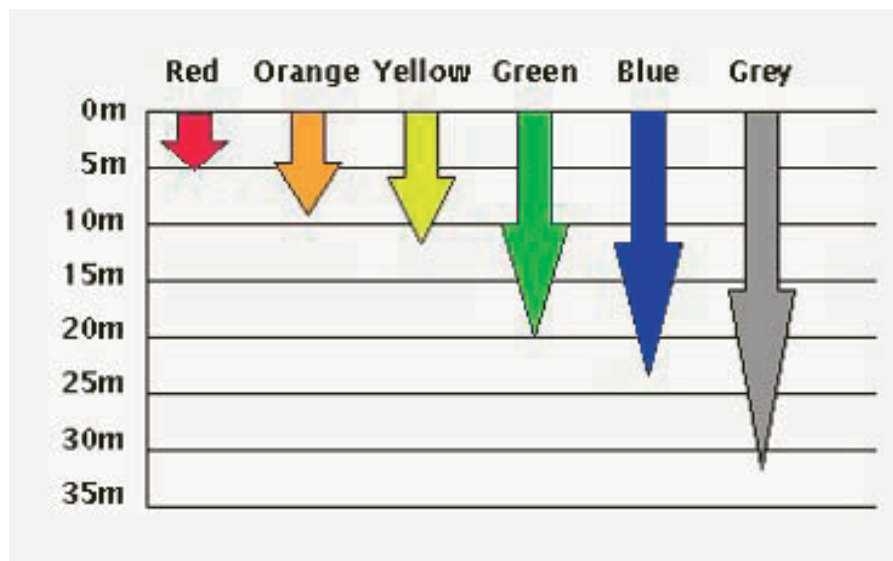
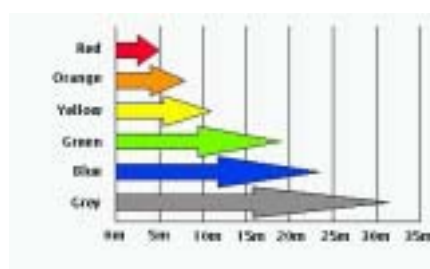


Figure 1. Light absorption with depth of water.

Figure 2. Light gets similarly absorbed horizontally.



Much of the red colour will be lost if there is more than 5 metres of water in the path from the light source to the subject to the camera lens, and many of the other colours will be muted as well, as they lose their red components.

So if you want bright colourful photographs then you must reduce this light path by:

A. getting the light source close to the subject (to cut down absorption on the way) by using an

underwater flashguns to provide a close white light source

B. getting the camera close to the subject (to cut down absorption on the way back) by using wide angle or macro lenses to get close to the subject

Of course, there are some alternatives, such as

A. Shooting in the top few metres of water below the surface - before colours have faded. The ripples in the water also cause varied and attractive lighting.

B. Shoot silhouettes or wreck shapes - relying on tonal contrast rather than colour contrast to make your subject interesting.

C. Shoot on monochrome film stock (no colour problems with black and white!)

Light levels

We now know that water absorbs light very quickly, even in seemingly clear water. In addition to this, not all of the sunlight that does fall on the water actually penetrates to the depths below.

Light entering the water at an angle near to 90 degrees to the water's surface, such as the midday sun, will enter easily, but light from more acute angles, such as sunlight in the early morning and late afternoon, or when the sea's surface is choppy, will tend to have a larger proportion reflected back into the sky than that which manages to penetrate underwater. Worse still, any particles or algae in the water will scatter the light in all direction, cutting down even more the light that manages to penetrate the depths.

The net effect is that below about 15m, even with a strong midday sun on a calm day in the tropics, available light is considerably reduced.

In reality, most underwater photographers use a strobe (flash) to restore colour and contrast, but there will be occasions when you want to capture an image of an object, such as a wreck, which is too large to light in this artificial way, and you must make the best of what light there is.

The actual light level is often hard to judge, as the human eye does a superlative job in adjusting for varying light levels and colour balances, but you can be assured that the vivid colours and crisp shapes you saw on that 25m wreck will come out looking grey and muted in your photographs.

Contrast

Contrast is important to all photographs, especially underwater images, but is easily lost, as the deeper you go, the more the light source will have been diffused and scattered by the water. Photographs

taken at the beginning or end of the day will invariably be lacking in contrast and backgrounds under such conditions are often rendered a rather muddy colour, and not the crisp blue that can normally be expected in clear water in the middle of the day. If you get such results, don't blame your equipment - just dive at different times.

Now while that is all very interesting (and you'll need to understand it when we go on to the next bit), this wasn't Marvin's problem, as he had been taking his photographs at about 10 metres in the middle of the day.

So what trap was it that he fell into? Well, having eliminated the camera, and the lighting conditions, why don't we have a look at the film.

Prints vs Slides

Films come also in two different types, either colour print films giving a negative image that can be printed, or colour transparency (or reversal) films which are suitable for projection. Slides have generally been favoured by underwater photographers, as they can be shown to a large audience, and professional publishers have in the past preferred transparencies.

However, just in case you thought underwater photography wasn't difficult enough, transparency film is much more sensitive to overexposure or underexposure than print film. This property is called exposure latitude, and is typically ± 4 stops for print film, but only $\pm 1\frac{1}{2}$ stops for transparencies. On the plus side though, transparencies give better contrast and colour saturation, for the same reason, and are well worth the additional effort to get right - even though it may be more hassle to get a good print made from them.

This difference in exposure latitude is only really evident when taking portrait format (rather than landscape) shots with graduated blue backgrounds. Slides can

capture a full range from light to dark, while print films give a somewhat more muted result.

What actual film to use is generally a personal preference, as each individual film stock returns slightly different results. I have noticed that underwater photographers choose to use a medium speed film (ISO 100) for wide-angle and other general work, but may use speeds down to ISO 25 for close-up and macro shots that are entirely lit by strobe.

Professional film brands profess to be more carefully quality controlled and stored to help professional photographers obtain identical colour balances from rolls of the same batch. There appears therefore to be no justification for amateurs to choose such films solely on the basis that they will give better results than the non-professional equivalent.

So how did Marvin get on? Well he didn't have any previous experience with slides, and wanted some normal prints that he could show his family and his friends at work, so he chose to use a PRINT FILM (gasps of shock and horror!). Was this his downfall?? Well no actually - there's nothing wrong with print film as millions of photographs taken every day show.

Well even though Marvin used a suitable camera and film, and took his photographs at about the best time of day, things can still go wrong.

There are still plenty of opportunities for low contrast results or even under- or over-exposure (even with print film).

We've had a look at Marvin's negatives, and they show some tolerable results. There are a couple of underexposed ones where he didn't wait long enough for the flash to recharge, and many of his shots are taken from too far away for the flash to have much of an impact, resulting in some low contrast shots.

So if the negatives came out sort of OK, where is the trap that



Boots, Crawley (who developed the film). Absolutely dreadful. I would want to sell my camera.



Boots, Crawley (when asked to reprint). A vast improvement. Slightly on the red side - skin tones match those to be found on land (but not underwater!)



Snappy Snaps, Victoria. A little better than the original Boots one, but still pretty dire.



Jessops, Victoria: A very creditable effort, and one which I'd be proud to show my friends and family.

Marvin fell into? So what did Marvin do wrong?

The answer is of course - nothing. Marvin did everything right, although he could have got a bit closer, and waited for his flash more patiently.

The whole thing went dreadfully wrong when Marvin, the amateur underwater photographer, handed his film over to his high street chemist or photo shop for developing and printing.

I'm no expert in photofinishing machines, although I know that they can be calibrated, and have the ability, under operator control, to compensate for a number of common photographic errors, including (yes - you guessed) underexposure and low contrast, presumably by attempting to boost contrast, brightness, and colour saturation.

Now in most cases the results are pretty reliable, as the operator knows what a school sports day should look like, and he probably also knows that people like their photographs to be more highly saturated than the real thing (it's

true!). What he probably doesn't know is what an underwater shot should look like, and how to correct the errors when in that environment.

As a consequence, getting a good print is rather a hit and miss affair.

You will see from the examples, the wide variety in print quality obtainable from high street photofinishers.

Perhaps the simplest solution to Marvin's problem is to ask your photo store to develop and print your films "without colour correction or exposure compensation" (at least on the first time through!).

Kodak SEA Processing

Last year the Eastman Kodak Company announced a new processing service called Kodak SEA Processing, aimed at solving the "inherent problems" with underwater images that result in prints with exaggerated green or blue tints.

Kodak's press release claims

that "the patented photofinishing process uses a blend of digital and traditional silver halide technology to optimize underwater prints, putting the same life and color in the print that the photographer saw on the dive."

Additional hints about how this facility might work are given in the product information for Kodak's DLS System Management Software that runs with their mini-lab film processors. An add-on is available to provide "one-touch" correction of underwater images by reducing the blue cast and adding contrast.

Apparently Kodak Sea Processing is not available in the UK due to lack of demand!

Printing Slides

Despite the attraction of slides, everyone will reach the point where they want to get a good hardcopy print of their best and favourite slides to mount on the wall or to put in an album to show those people who won't sit still for the obligatory slide show.

Unfortunately, prints cannot be obtained from slides with the same degree of availability as you can get a set of prints from your local high-street developers. Fortunately though, there are specialist processes that can produce prints that at least match the best hand-printed negatives, and which, some would claim, produce even better results.

Please don't ever expect a print to come up to the quality of your projected slide. There are plenty of reasons why this doesn't happen, the main one being that there is much less contrast range in a print than there is in a slide!

Mark Mumford

Realm of the Pygmy Seahorse

An Underwater Photography Adventure



Constantinos Petrinos

Scientific Editor: David W. Behrens

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