

Digital Infrared Photography Underwater

by Kathy White

Digital infrared photography underwater? It's not possible, surely? This was the general consensus when I spoke to people about doing infrared photography underwater. Fortunately a very wise friend told me to think positively and give it a go anyway. After all, what did I have to lose?

What is infrared (IR) light and where does it come from?

Light is measured in waves and the light spectrum is made up of both visible and invisible light. Visible light ranges from about 400 nanometres (nm) to 700 nm on the spectrum. Beyond 700nm up to about 1200nm is referred to as near infrared light.

The near IR light is the light that we can capture with a camera, either by having one converted or by using an IR filter.

A common misconception is that the IR light we can capture with a camera is similar to thermal imaging; however thermal imaging is between the ranges of 7,000nm to over 14,000nm on the light spectrum. To capture this requires specialist, very expensive equipment.

As with any other kind of light the sun is the biggest source of IR. As underwater photographers, we know that the first colour to be absorbed in water is red, hence the natural doubt as to whether it would be possible to capture it.

As with visible light, the speed that it gets absorbed will depend on many factors, including the time of day, surface waves, clouds, depth etc

Whilst doing some research for this article, I read somewhere that all flashguns omit IR light. I am no scientist or technical expert so I would like to say 'most' flashguns (just in case yours can't for some reason!) could omit IR light, including my Inon Z240's.

How to record IR light

Most digital cameras are capable of recording small amounts of IR light. However they are fitted with a filter to block this allowing only visible light through.

One option to record IR light is to attach an IR filter, for example the Hoya R72, to the lens. This will block any visible light and only allow the IR light to pass through. Long exposures are needed so it is impractical underwater but is a valid option on land assuming you have a sturdy tripod!

The other option is to have a spare camera body converted for IR. Once it has been converted it can no longer be used as a normal camera unless you have it converted back.

There are 3 main stages to the conversion process:

Camera sensors are fitted with an IR Cut Filter (ICF), also known as a hot mirror filter. The first



*Reef and snorkeler
Nikon D300 converted for infrared, Subal housing, 2 x Inon Z240 strobes, Tokina 10-17mm, f3.8, 1/30 sec, ISO 400*

stage of conversion is to remove this.

The second stage is to fit a filter to restrict the visible light. You can choose the level of filter that you would like. A comparison of the different effects is available on lifepixel.com. The most

common is the 720nm filter, which still allows a small amount of visible light through to enable colour infrared photography.

The final step is to re adjust the focus as IR wavelengths are longer than visible ones and therefore focus at a different point.

I had a Nikon D300 converted with a 720nm filter by Advanced Camera Services (www.advancedcameraservices.co.uk). Conversion prices start at £250 plus VAT.

Lifepixel (www.lifepixel.com) in the USA also offer a comprehensive conversion service.

Please note that not all models are capable of being converted so please check with a company like ACS or Lifepixel before you go out and buy a new camera body!

So what happened underwater?

The most obvious feature of IR photography on land is that foliage reflects IR light and therefore this shows up as shades of white. Water absorbs it and so shows up very dark, as do deep blue skies.

With this in mind, I guessed that underwater my backgrounds would predominantly be black past about 5m and I would rely upon my Inon's to provide the IR light.

On land I would set the white balance manually using some well-lit grass as my reference. Underwater, as I wasn't sure what would happen, I left my white balance on automatic.

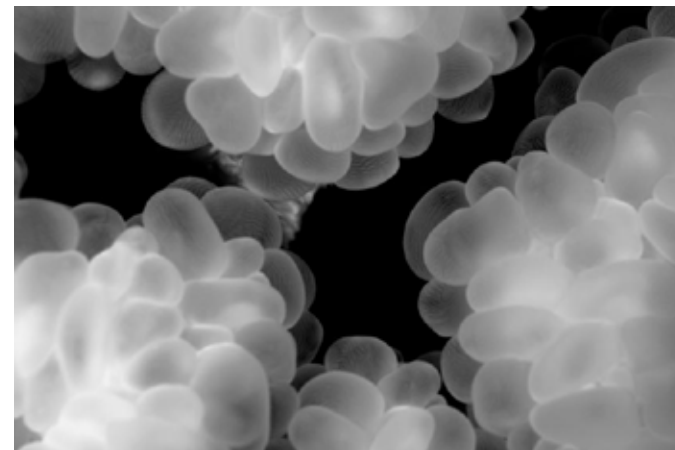
I thought I'd start by shooting into the blue and seeing what, if any, ambient IR light was about. The shot was black. OK, so I was at about 15m so it was no real surprise. I opened the aperture right up, slowed the shutter speed right down, increased my ISO and tried again. Black.

(Right) Soft corals

Nikon D300 converted for infrared, Subal housing, 2 x Inon Z240 strobes, Nikon 60mm macro lens, f11.0, 1/160 sec, ISO 200

(Below) Clownfish and anemone

Nikon D300 converted for infrared, Subal housing, 2 x Inon Z240 strobes, Nikon 60mm macro lens, f16, 1/160 sec, ISO 800



Summary – no infrared light down here, no big surprise! I would try again when I was back nearer the surface.

The next thing for me to try was to light some corals using the IR light from the flash - success. I used my equipment in exactly the same way I would do normally, except I had to use wider apertures and higher flash settings. Exactly how much will depend on distance from the subject, aperture, conditions etc

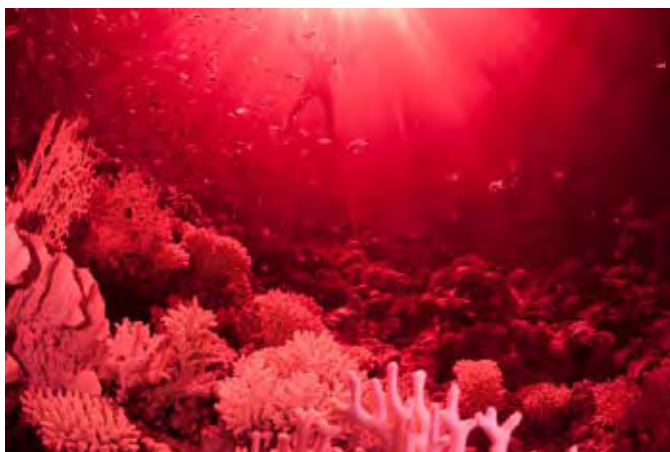
A brief opportunity with a lionfish worked well, taking full advantage of the blue background that I knew would look black on screen. By this point, I was excited and convinced that it would work. Before I knew it my hour was up and I headed back to the boat. My plan for dive two was to stay shallow and go for some natural light shots.

By the time I got in for the next dive it was late morning and the sun was high in the sky. Normally, I would rarely attempt to shoot up to the surface directly into the sun at this time of day but the very limited IR light about allowed me to do just that. I took several shots of snorkelers on the surface from about 7m before ascending slightly and taking some images of the corals.

So far, so good so I decided I would have a go at some macro on the next dive.

The site I chose was Anemone Reef, which was covered in anemones. I spent most of the dive taking some images of the anemone fish 'dancing' above the anemone. I was between 15 and 20m for most of the dive, so getting the black backgrounds was very easy.

Now that I had my images I needed to process them.



Snorkeler and corals – unprocessed image straight from camera. Nikon D300 converted for infrared, Subal housing, 2 x Inon Z240 strobes, Tokina 10-17mm, f3.8, 1/30 sec, ISO 400

Processing techniques

I processed the images in the same way that I would for land ones. There are two main methods I use depending on if I want a colour or black and white image.

The black and white process is easiest as this is done in the same way as you would convert any other image to black and white. I prefer to do mine in Photoshop using the Black and White Adjustment. I would then apply minor adjustments to contrast and curves as required. There are of course a number of ways you can do this depending on what you are familiar with already.

For the colour images, I use the Channel Mixer in Photoshop and swap the red and blue channels over. For land images this produces blue skies and water and leaves the foliage white. Underwater it turns most of the image blue!



Snorkeler and corals - processed image Nikon D300 converted for infrared, Subal housing, 2 x Inon Z240 strobes, Tokina 10-17mm, f3.8, 1/30 sec, ISO 400

Depending on which filter you have fitted in the camera will depend on the final colours. Personally I prefer the 720nm filter, as the colours are subtler.

Summary

Although some of the effects could probably be achieved with a normal camera in post processing, I don't like to spend too much time at the computer and would far rather get it as right as possible in camera without the need for lengthy processing.

Having said that, there are several areas where I believe you can achieve results that you couldn't with a normal camera.

Firstly, you are able to shoot almost straight into the mid day sun at shallow depths without over exposing the highlights and / or under exposing the foreground.



(Left) IR Anemone.jpg
The top image is straight from camera with no processing apart from cropping. The second image has been processed by swopping over the red and blue channels in Photoshop. The final image has then been converted to B&W using Photoshop.

Nikon D300 converted for infrared, Subal housing, 2 x Inon Z240 strobes, Nikon 60mm macro lens, f8.0, 1/160 sec, ISO 200



(Right) Infrared shot taken on land and converted by swopping over the red and blue channels in Photoshop

Nikon D300 converted for infrared, Nikon 17-55mm f2.8 lens, f16, 1/60 sec, ISO 100



Secondly, you can create wide-angle black backgrounds with ease during the day meaning that you can skip the night dive. This may not be a bonus for most but it is for me!

Thirdly, you can create black backgrounds much easier with macro, despite what you may be shooting into.

Finally, I have found that you get a much greater tonal range with IR, which is an effect I personally really like. I have taken images of the same scene on land with both my IR and my normal camera and have been unable to replicate the effect in Photoshop, despite several attempts. Having



said that, my Photoshop skills are somewhat limited so maybe someone with better skills may have more luck!

Although I am still in the very early stages of experimenting with this, I have been really pleased with what I have got so far and I'm definitely going to be doing more of it. My next dive trip is fast approaching and my IR camera is already in my kit bag.

I find it fascinating that we can photograph something that we can't see and I still occasionally get a surprise when I press the shutter, as things are never quite how you think they are going to be!

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