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digital photography

AVOIDING CAMERA CONFLICT - PART 2

In hindsight, all wars are preventable. You just have to spot the trouble coming and then use diplomacy to solve the problem. In the last issue we looked at photographic wars that can befall us, no matter how good (or bad) our camera may be. Let's look at a few other issues that can have us firing missiles in frustration.

ZOOM, ZOOM, ZOOM.
I love zoom lenses. They make life so much more pleasant. Gone are the days of carrying three camera housings to cover wide angle and macro. One will do it now. Maybe there are a few compromises, but I am willing to live with them if it makes my job easier. When you buy a compact camera, it's understandable if the sales blurb has you all confused. Numbers fly when zoom ranges are mentioned, and it all sounds too good to be true. Often, it is.

Essentially there are two types of zooms: optical and digital. An optical zoom is one where the optics of the lens change or shift to create a longer or shorter focal length, from telephoto to wide angle. Early zoom lenses went through all sorts of physical contortions to accomplish the magic of zooming in and/or out. Glass elements zipped back and forth, barrel lengths stretched

A lens will fill the entire camera sensor. In fact, it will cover more than the sensor as the image it 'throws' is circular and our image is usually rectangular so the lens needs to cover all corners. When we use an optical zoom, the focal length increases so that our subject, the lionfish, fills more of the sensor area. However, with a digital zoom, the original area is cropped (as indicated by the dotted line). The result is visually identical, without all those expensive lens mechanics, but the number of pixels recorded is a subset of the original, making a smaller file. It's like having a pizza with one small piece of sausage in the middle. I am sure that you would prefer having a much, much bigger piece of sausage, not have all the excess pizza chopped off to make the small piece of sausage appear bigger.

like Pinocchio's nose in a Shrek movie, air sucked in and out of the barrel as everything contracted and expanded. They were a cross between a sludge pump and a telescoping car aerial. And the optics were 'orrible. Ghosting, flare, chromatic aberration, barrel and pincushion distortion (all in the one lens, depending on the changing focal length) and sharpness was, well, not good.

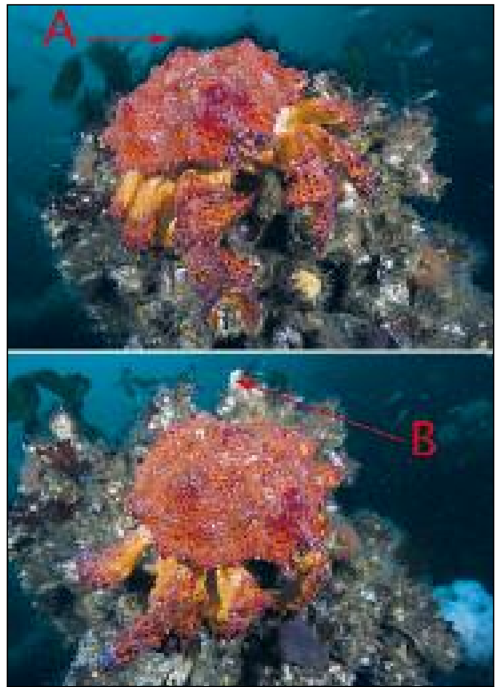
Modern zoom lenses are a joy to use. The mechanics are smooth, sharpness is excellent (maybe not as good as a prime lens, one with a fixed focal length, but pretty darn close), distortion is minimal and colour issues are kept well in check. As with all lenses, generally the more you pay, the better the result. And at the 'hard to make' end of the scale, wide angle zooms (as opposed to longer focal length zooms) are just magic, more so those designated for professional use. They even have rubber seals all over, including where they mesh into the camera body, so minimal dust is sucked in and out, most of which would normally end up on your sensor, looking like dark fuzz balls or sharp black distorted sticks, depending on how close to the sensor pixels the hair and dust is sitting.

When you change the focal length of an optical zoom, the internal physics change so that the area of view concentrated on the sensor is smaller or larger than normal. The smaller the image magnification cast onto the sensor, the more area can be seen in the resulting photo, so you now have a shorter focal length, or wider angle lens. The larger the image, the longer the focal length, so a smaller area is now covering the sensor, making it a long focal length.

Don't worry if that sounds a bit complex. Just remember that with a digital zoom, the optics do not change. What happens is that the file taken is cropped so that the visual effect is similar to an optical zoom. For example, let's say you have a photo taken from your camera and opened in your photo editing software. The file is the full image produced by your sensor. Now, if you were to crop off half of the image, the outer area of the photo, the visual effect is the same as if you had 'zoomed in' with an optical zoom lens. But, now you have only half the pixels to work with. You have cropped off half of the file so now the amount of enlarging you can do is severely restricted.

For example, let's say you photograph a coral head with a lionfish above it. All well and good. But now you decide you want just the lionfish. You can do two things. Either use a longer lens or move in closer. There is no third option. So, if you use an optical zoom, you can increase the focal length to 'zoom in' on the fish until it fills the frame then take your photo. Or you can slowly move in, keeping the same focal length, until the fish fills the frame. In both cases, the file from a, say, 10 megapixel camera, will be 10 megapixels, or about a 30 megabyte file.

However, if your camera is equipped with a digital zoom, when you 'zoom in' on the fish without moving forward, all you are doing is cropping out the external area. Your 10 megapixel file is now cropped down to half that, or more depending on the amount of zooming, or to be more accurate, cropping, you use. So now instead of a 30 megabyte file (10 megapixels x 3 colour channels, Red, Green and Blue, = 30 megabytes) you are now stuck with a much smaller file, maybe only 15 or 10 megabytes.



While a shutter speed of 1/60th second or more is preferred, you can get away with a whole lot as long as you are stable. Here, a Puget Sound King Crab (Lopholithodes mandtii) is ambling across the reef on a dark day in deep water. Shutter speed for this shot was 1/4 second to pull in some light from the background as I did not want a harsh black background. I was well wedged into the reef and was able to hold still easily to get the shot. You can see the kelp registering movement in the top shot and even the slow lugubrious amble of the armoured monster is visible as a dark fringe (A) where it blocked the ambient light in the background. When it moved against the flash lit reef (B) the fringe disappeared as the available light applied to all the background, while the much darker reef and crab where lit by the flash.

Another way to look at this is when using a 'full frame' sensor, one that is the same size as a 35mm film frame, as opposed to a smaller sensor, maybe 2/3 the size of a 35mm film frame. If you use a given focal length with the full frame sensor, you will end up with an image that is 'normal' for that lens, as far as magnification goes. If you then use the exact same lens on a camera with a smaller chip, the area recorded is smaller, with the effect of making the image appear as if taken with a longer lens. This is exactly the same process with digital zooms, they do not change in focal length, they just record a smaller area to make it look as if you have 'zoomed in'. Just as a smaller sensor will provide a smaller image file, a digital zoom produces a smaller image file.

Now, an image taken with a digital zoom may be enough for your end use. The extent of your photographic endeavours may be limited to the actual picture taking and then looking at them on the LCD screen of your camera, or as a slide show on your laptop. Or maybe a posting on the internet. All uses where low resolution files will do just fine. The problem starts when you want to make a large print or submit them for publication. You can still get away with a small file if it is printed in a newspaper type product (i.e. Dive Log) but will not have the quality and image size to be used in a higher resolution product, such as a glossy dive mag cover (i.e. Sport Diving).

If you want a camera that you can grow into, and not rapidly grow out of, then when purchasing your camera, keep an eye on what type of zoom is provided. With digital SLR cameras, they are all optical zooms. Digital zooms are found in many compact cameras which do not have interchangeable lenses. Not all compacts have digital zooms, many have excellent optics (for the price) with some fairly radical zoom ranges, all supplied with moveable optics. Some have a hybrid of both optical and digital cropping. Just be certain of what you are getting.

I recently observed a tourist photographing an ancient building using a camera with a fixed zoom lens. At the extremes, it had a moderate wide angle zoom ranging up to a 600mm focal length. Initially I was sceptical but, with the help of image stabilisation and a reliance on solid objects against which to lean, the results were disturbingly good. While impractical for underwater use, the technology is there. Hmmmm. A 10mm to 300mm zoom with 1:1 macro ability. That would be fun to use.

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There is enough movement here as it is, with a strong current acting on the kelp fronds and a light, buoyant kelp float bouncing around. In these temperate waters, shutter speeds were always minimal so any extra bouncing around from jabbing at the shutter will give you blurry results. Practice a steady hand, breath control, keep the camera close to your body (you would normally have it jammed up against your mask with your arms tucked in) and, above all, squeeze the shutter button with a fluid motion.

SHAKE, RATTLE AND ROLL

It really is annoying when you get it all right, only to find later that your shot of the mating turtles, or your dive buddy on that expensive dive trip, is suffering from a major case of camera shake. As mentioned in the last issue, ignoring your camera's feedback is often the problem.

Our brain automatically responds not just to colour casts, adjusting to them rapidly to make the world look normal, but also light levels. For example, beginner photographers often blast away with hand held cameras when indoors, ignorant of the fact that the available light has plunged to unusable levels. That's why camera manufacturers have at least one auto function where the flash will cut in once exposure levels drop below a certain point. Which is why those stadium spectaculars shown at night have all those annoying fireflies flashing away. The punters think that because, to their brain, it looks bright, then there is enough light for a photo. And since that is not the case, the auto system fires off the flash, but all in vain.

The same goes for underwater photos taken in less than optimal light. Just ducking below the surface will lose you 2 f-stops, even more when you descend below, say, 10m, and a whole lot more when it's very early in the day, after mid afternoon or when cloudy and overcast.

Keeping your eye on your camera's readout is important. Once you see the shutter speed drop below 1/60th of a second you are in the danger zone. Yes, you can rely more on your flash at these times but that may not be what you want or need. The simple solution to slow shutter speeds is to use both a steady hand, or to be more precise, a steady finger, and also use the surrounds to prop yourself to avoid camera wiggle. I often use shutter speeds of 1/15th of a second or longer, even for a few seconds in extreme conditions.

Like firing a gun or releasing an arrow, if you and your hand(s) are not steady then you're going to miss your target. Underwater currents can roll us about, cold can cause a bit of a rattle, as can excitement at finding a stonefish eating a squid. Like a good sniper, you should use breath control along with a focused mind to steady your camera, then gently squeeze the shutter leaver. Don't poke at it, don't jab, don't jerk. Squeeze. Slowly and with purpose. The lever or button is connected to the camera's button inside, not the housing, so the pressure from your finger should not make the housing move. Practice at the kitchen table. Don't hold the housed camera up to your face, just hold it out from your body, unsupported, and practice squeezing the trigger.

The other thing that helps steady the process is using the sea bed or objects to prop up against, either the camera or your body or both. One obvious caveat here is that you should not be damaging the reef when you do this. Don't drop down on a plate coral or squish a sponge. No need for that. Find some dead coral, a bare piece of rocky reef, open sand patch or whatever and place yourself and/or your camera carefully. In most cases, only the camera needs to be propped, although having your arms/elbows supported also helps.

Because the water in which you are immersed supports your whole body you can get away with a lot. I have managed to steady myself using just a fingertip inserted into a bare patch on a vertical wall, pushed the strobe arms or housing up against my arms or shoulder or face (or all of the above) and squeezed off a 1 second exposure, producing a sharp image.

You have no excuse. The camera viewfinder, or the LCD screen, is constantly feeding you information. If your camera is struggling to keep up, such as this 1/3 second exposure, then do something about it. Switch to manual, set a higher shutter speed and use your flash as the primary light.

If you are aware of the required shutter speed, you can take steps to steady your rig. In fact, you can use super slow shutter speeds to create all sorts of great images, often with the most mundane subject matter. Combine a ultra slow shutter speed to bring in the background then add strobe light to the foreground. Like depth of field and composition, blur from long exposures can be used as a tool. Just avoid the wobbly rattle and roll shakes when you do it.

BLINDING LIGHT.

In the past we have discussed how to use your histogram to control your exposure. You would not want either shadow or highlights to be clipped. Most cameras, besides the histogram, provide an overexposure warning. Usually an area with zero information (Red 0, Green 0, Blue 0 pixels) will flash or pulse with a grey or coloured patch where the offending over exposure is happening. You will also see in the histogram that a range of pixels are bunched up against the right hand side of the graph, indicating over exposure.

The simple solution is to reduce your exposure, either with a smaller f-stop or a faster shutter speed. But often, that does not solve the problem. In fact, while you are reducing the exposure, all the mid range pixels, which make up the meat of your image, are being pushed to the left, making them darker and darker until you end up with a near black image but with highlights still blinking away.

An example of this would be a sun burst in the image or a specular highlight, such as your flash reflecting off the polished metal parts of your dive partner's regulator. You might reduce the size of the offending area but you will destroy the rest of the image well before you get it under control. The main reason for this is that a digital sensor has a much narrower contrast range than the human eye. And let's face it, squinting into the sun will always have you seeing a bright white disc, and spots for many minutes after. Even we cannot adjust to the brightness of the sun's disc.

So, at times you have to bight the bullet and realise that, due to the limitations of modern technology, you might have to have areas where there is no information, such as the above mentioned specular highlights or the disc of the sun. Knowing the limitations of your sensor allows you to work around the issue and also helps you to just move on when your sensor falls flat on it's digital face. You can and should make adjustments to your exposure to record information in bright white sand or dark black sponges. But some situations cannot be saved, even with advanced editing such as blending exposures.

No matter how good your camera and sensor, there are times when nothing will be recorded in an area of your shot. A common example is the sun or sunburst (A), specular highlights on shiny metal or water. No amount of exposure bracketing will provide extra information, it will always be blown away (B) into the maximum 255 pixel count. You can use the curves function to darken the sun but that does not add detail, just turns it into a muddy disc. So, while normally a clipped highlight is a bad sign (C) in your histogram, you may have to just live with it in extreme contrast circumstances.

The important point to take away with you is that you need to be aware of your camera's limitations compared to your own brain and vision, and work within them. Be aware of what your camera is trying to tell you and adjust your technique accordingly. It will save you from many disasters, and probably avoid a war into the bargain. ■

LINKS>

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