Seven 'Deadly Sins' Found In Our Galleries: Part 1 - Ian Wilson, PhD(optics)

[Editor's Note: This article is a reproduction of Ian Wilson's presentation at the 2015 Digital Photography in the Bush event, at Hunter wetlands Centre, Newcastle. It is being presented in two parts in this newsletter; Part 2 will appear in the August 2015 issue.]

When I look at the images posted on our gallery I see the same kinds of shortcomings repeated over and over. It is not only beginners who make these basic mistakes; we all make mistakes and even our most experienced photographers sometimes commit photographic indiscretions. In this talk I discuss these shortcomings, the seven 'deadly sins', and provide a check-list for members to use before posting to the gallery. Currently, about 90% of images posted have at least one of the seven deadly sins and it is my hope that by talking and writing about these, the overall standard will improve. We have a long way to go to reach the standards I see on some other online galleries, notably, BirdPhotographers.Net (BPN) http://www.birdphotographers.net/forums/ with over 10,000 members world-wide and where many of the best photographers post their work. If you want to be inspired, check out the work of Gail Bisson, Daniel Cadieux, Arash Hazeghi, Alan Murphy, Greg Oakley, Arthur Morris and others on BPN.

It is important in bird photography to understand the strengths and weaknesses of your gear. This will save a lot of time and avoid disappointment. If you have a modest camera you will probably find that the AF system is not fast and accurate enough to consistently take good shots of birds in flight. Unless you have a long focal length lens, you will find that waders are often too small in the frame. Many cameras struggle in low light and only work well in sunshine. You need a mental picture of the performance envelope of your gear and target only those situations for which your equipment is well suited. This may require getting close to the bird or rather, letting the bird come close to you. The British pro, John Robinson, is a master at constructing hides from which he takes outstanding close-ups using a modest camera and zoom lens.

To prepare for this talk I conducted a random survey of 100 images posted to our gallery in July–September 2014. I critically examined these images to discover the most common deadly sins and to estimate the frequency of occurrence of these shortcomings. Below, I will discuss each in turn.

In-Camera Issues

1. Images not in focus or with insufficient depth of field

It should not be necessary for me to mention that an image with the bird not in focus is fatally flawed. The wonder is that some people post these images to the gallery when they should be consigned to the rubbish bin. This is a common problem with flight shots; just because a bird is captured in flight does not mean way out of focus or lots of movement blur is acceptable.

Issues with depth of field (DOF) are more understandable; we are not always ready for the unexpected and can forget to adjust the camera aperture for optimal DOF when an opportunity suddenly arises. This is often the case when a bird pops up closer than expected and requires the aperture to be closed down to give more DOF. Quickly adjusting to the situation comes with experience but first you need to know the DOF for your camera and lens combination for different aperture settings and shooting distances. You can readily find this information using an online

DOF calculator such as http://www.dofmaster.com/dofjs.html. I made up a little printed table for my camera/lens combinations and carry it around in my photography vest.

Some photographers are reluctant to close down the aperture to increase the DOF but with modern, high sensitivity, low noise cameras, this is no longer an issue. Today, 'sharp where it counts' is a back-handed compliment; 'sharp from head to tail' should be the objective. Shooting at full aperture is only necessary in low light or when a narrow DOF is required for special effect.

In my survey I found that about 35% of images sampled had the bird either out of focus or with a serious depth of field problem. Fig. 1 shows an example which, at first glance, doesn't look too bad, but it is unacceptable because there was insufficient DOF to bring the near wing into sharp focus. The softness is not movement blur because the exposure time was short enough at 1/3200 sec to 'freeze' the action. Had the near wing been in focus and the far wing out of focus the image would be acceptable to most people, but it is fatally flawed the way it is.

Fig. 1. A DOF problem with the near wing not sharply in focus.

2. Incorrect exposure

Of the seven deadly sins, I found evidence of incorrect exposure in about 30% of images but I suspect many images were adjusted in post-processing so I underestimated the true number. Incorrect exposure arises because we tend to expose for the overall scene rather than focussing all our attention on the optimal exposure of the bird. The semi-automatic shooting mode, aperture

priority, is often to blame because it is easily tricked by the background light. Some of the background light is usually detected by the camera's exposure meter leading to an error in the computation of the required exposure of the bird. The result is over- or under-exposure depending upon whether the background is darker or lighter than the bird. If you find you are consistently shooting against a dark background, causing over-exposure of the bird, then you can correct this by adjusting the camera to provide some negative exposure compensation. Similarly, if the background is causing under-exposure, apply some positive exposure compensation. If you have a resting bird, you can also use exposure bracketing to achieve optimal exposure. In most cases it is an advantage to use spot metering, a mode in which the camera's exposure meter is restricted to a small field of view in the centre of the frame.

When you become more experienced, you will probably find that it is just as easy to set the camera exposure manually, like photographers did in the old days. There is a perfectly good exposure meter visible in the viewfinder and if your camera is set up right, you can quickly dial up the optimal exposure while looking through the viewfinder as you compose the shot. This is considered best practice and is the method used by most professional photographers. To achieve convenient operation you may need to use custom settings of some of the dials and buttons on your camera.

There are advantages in over-exposing so whether you are using aperture priority or manual exposure settings, err on the side of over-exposure. A moderate amount of over-exposure is easily taken care of with the brightness (exposure) slider in post-processing. Pulling back the brightness has the effect of reducing noise. If you find your image is under-exposed and you need to brighten it in post-processing, then you will enhance the noise, a very undesirable result to be avoided if at all possible.

The camera's exposure meter is the primary tool used for checking the exposure while you are composing the frame before pressing the shutter button. After you have taken the shot, on most cameras, there are two other tools that help to confirm optimal exposure when you replay the image on the LCD screen. The first is the 'histogram' display which shows graphs of the brightness distribution recorded by the red, green and blue channels of the sensor. It shows the aggregated information for the entire scene and is great for landscape photography but of limited value in determining whether the bird is well exposed unless it is white or big in the frame. The other tool is the highlight alert and this is very useful, especially when photographing birds with white or light coloured parts. The highlight alert blinks on those parts of the image which it thinks are over-exposed. The brightness scale it uses has 256 steps, the number of steps in an 8-bit quantization.

A nice example of the benefit of over-exposing occurred at the Ingham DPITB weekend when a Barn Owl flew across the road in front of our car and landed on a nearby perch. I deliberately overexposed about one stop which can be seen in the histogram and highlight alert (red) in Fig. 2(a). The histogram and highlight alert shown is on my computer screen but it is the same as one would see on the camera LCD. Fig. 2(b) shows the image after the brightness was pulled back by 1.17 stops and Fig. 2(c) shows the final version of the image after processing; it is clean, sharp and free of noise.

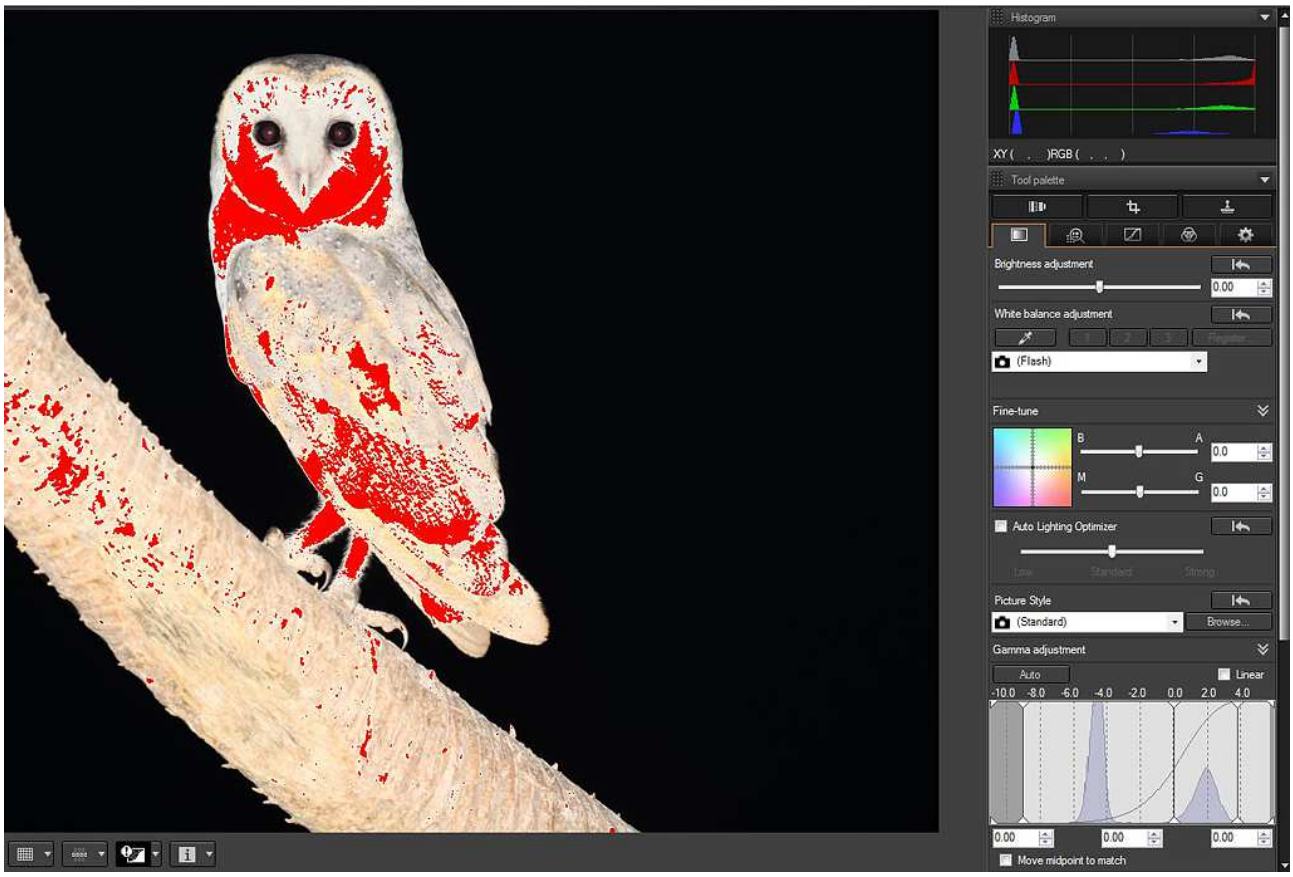

Fig. 2(a). Moderate over-exposure indicated by the red highlight alert can be an advantage.

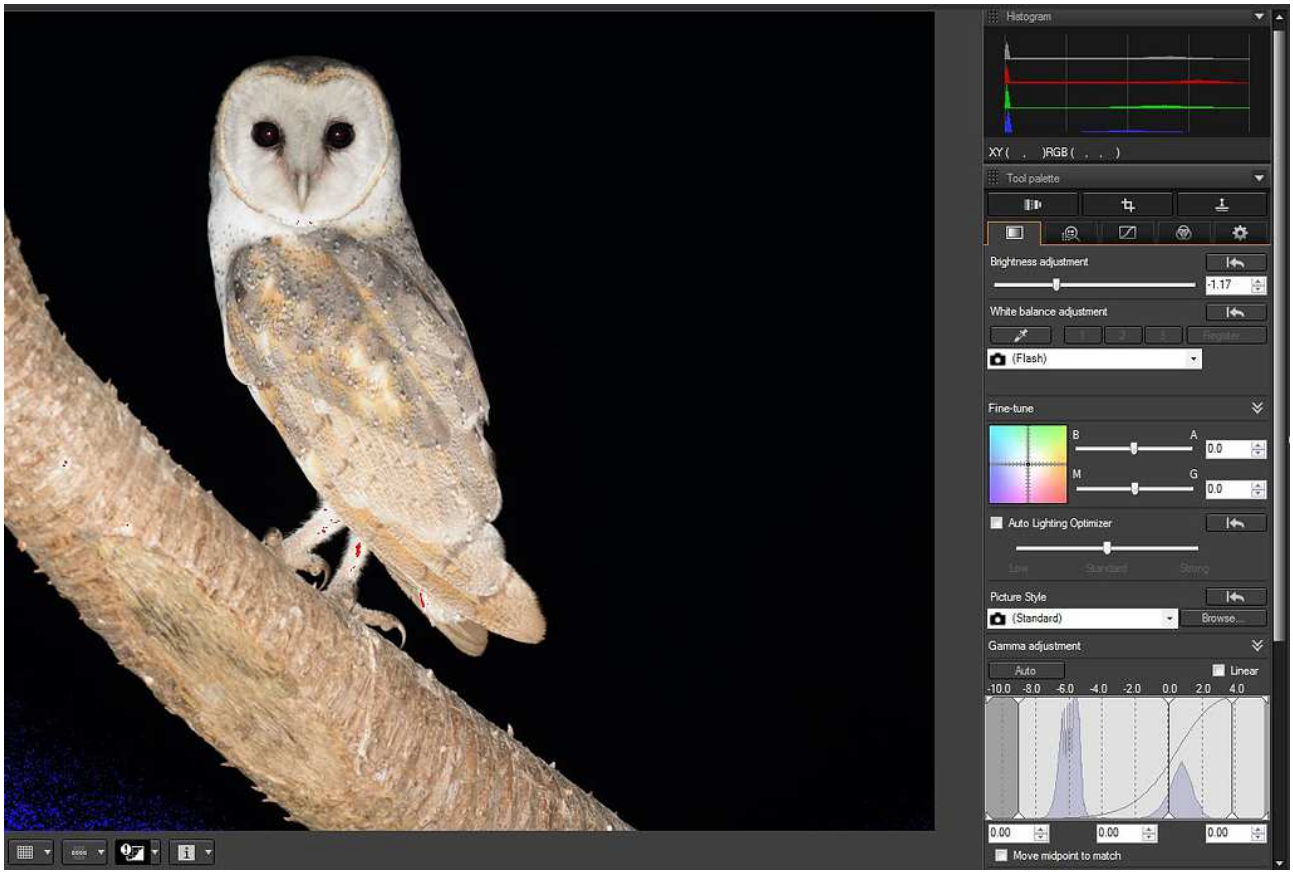

Fig. 2(b). A screen grab showing the image after the brightness has been pulled back just over one stop.

Fig. 2(c). The finished image appears clean, sharp and noise-free.

If you are shooting RAW files the sensor will be recording 12 or 14 bit files, depending upon the camera model, with more dynamic range (4096 or 16,384 steps) and more 'head-room' than an 8-bit file such as a standard JPEG. This means that if the highlight alert is just starting to blink, the RAW image recorded by the camera will still be within the 12–14-bit brightness range but it will be fatally overexposed if you are shooting JPEGs. By watching the highlight alert one can increase the exposure on the bird up to 1.5 stops more than the point of fatal over-exposure for a JPEG image. When fatal over-exposure happens, neighbouring sensor pixels all have the same read-out value

and appear as a bright neutral white patch. Then we say the highlights are 'clipped' or 'blown out' and image contrast is lost, a situation that must be avoided. Do not be too concerned if the background starts to blow out, there are ways of dealing with the background in post-processing. The important point is that the bird needs to be properly exposed even at the expense of blowing out the background. If parts of the bird are fatally blown out, they become an information-free patch of data and there is no way of recovering the lost image detail. Because of the extra dynamic range and head-room available when shooting RAW files, it is a great advantage to use this file format rather than JPEGs.

Post–Processing Issues

One of our gallery moderators reminded me that there are lots of good images posted which would be so much better if a few basic adjustments were made in post-processing. For some reason, a significant number of members appear to do little more than crop and resize their images before posting to the gallery. One of the reasons may be a lack of knowledge about what basic adjustments are needed, how to make them, and with what software. Image processing software can be expensive and overwhelming so my advice, if you are new to this game, is to start with an entry level package such as Photoshop Elements (PS Elements) which is just a cut down version of the flagship product. It uses the same embedded algorithms and computer code as the complete versions of Photoshop but without all the bells and whistles that you will probably never use. If you are shooting RAW files you will need to make some basic adjustments and convert the image to a suitable file format (16 bit TIFF or PSD) before sending it to Photoshop for possible further refinement and downsizing for the gallery. The latest versions of PS Elements come with Adobe Camera Raw (ACR), a fully integrated RAW file adjustment and conversion package. If you are a Canon shooter, you may prefer to use the Digital Photo Professional (DPP) software supplied in the box with your camera or downloaded from Canon Australia. The latest version 3 and version 4 issues of DPP produce exceptional image quality and are my preferred RAW adjustment and conversion software. Images processed in DPP need to be output to PS Elements or a similar package for finishing and downsizing.

Some basic adjustments are essential if you wish to show your work at its best. In the rest of this presentation I will discuss the most common post-processing faults and how to avoid them.

3. Basic lighting adjustments

Incorrect lighting adjustments made in post-processing are very common in images posted on our gallery. I found about 50% of images have some kind of lighting adjustment problem. The main issues are blown highlights and blocked up blacks and whites. It is easy to blow-out the highlights in post-processing even if the image was properly exposed in the camera. One of the most common causes is trying to increase the overall brightness of an image that has a dark background. If a global brightness adjustment is made, one can inadvertently increase the brightness of parts of the bird to the limit of the available dynamic range. If you are viewing an 8-bit image, the dynamic range of brightness will be 0–255 data numbers (DN). You can use the highlight alert in your processing software to watch out for parts of the bird where the brightness has reached 255 DN. Do not increase the brightness any further otherwise you will begin to lose

detail. In practice, you will find that if you adjust white parts of a bird to 255 DN they will probably look too bright and fine feather detail will be washed out. With this in mind, it is better to set the brightest white parts to 245 DN, a level of brightness more comfortable for the eye and one which allows subtle changes in contrast to be seen.

It is also important to watch out for blow-outs in the brightness of individual colour channels. This can easily happen, for example, in the red channel of a bird with a bright red bill such as an oystercatcher or the red breast of a male winter robin. If the red channel blows out, you will start to lose detail but more subtly as the green and blue channels will remain within their dynamic range and you may not even notice that you have a problem. Depending upon the software you are using, you may be able to run a cursor over the image and read the RGB data numbers. Suffice to say that blow-outs can occur on one or more colour channels when you make adjustments using the brightness, highlights, whites, saturation, contrast and vibrance sliders. You need to keep an eye on the RGB brightness values in critical parts of the image when adjusting any of these sliders.

Adobe provides some of the best tools for managing lighting adjustments in their RAW processing and Photoshop products. In particular, the Levels adjustment dialogue box in Photoshop is a handy tool for checking the brightness of whites and colour channels using the blacks and whites threshold screens. The same kind of threshold screens are available in ACR and Lightroom for checking and adjusting RAW files. The main adjustment is to set the black and white points in the image and stretch the contrast between these two extremes. You should start by setting the black point and then the white point. The default dynamic range for the output brightness is 0–255 DN which we previously suggested was a bit too much at the white end. A range of 0–245 DN is usually better and this can be achieved by backing off the white point slider or using the output level adjustment in the dialogue box. The final tweak is to adjust the mid-tones; these are the parts of the image with a brightness value around 128 DN. Adjust the mid-tone slider to obtain the overall brightness you want – there is no right or wrong way to do this, it just depends on how you remember the original scene and your personal taste. Mid-tone adjustment can also be used to increase the contrast of the whites or the blacks but not both together. If you use Canon DPP, the black and white points and mid-tone adjustments are made by directly manipulating the gamma curve which converts the RAW data brightness values into output brightness values matched to the sensitivity of the human eye (luminosity values). I find this approach satisfying from a photographic science point of view because the slope of the gamma curve is proportional to contrast and governed by the principle of ‘conservation of contrast’. This principle states that there is an overall contrast budget for an image so that if, for example, we increase the mid-tone contrast by amount x, then the contrast of the blacks and whites will each be reduced by x/2, thereby conserving the overall contrast budget.

That takes care of the basic lighting adjustment but you may find on close inspection that there is little or no detail in the light and dark parts of the image. When this happens, the whites and blacks are said to be ‘blocked up’. This is because the changes in contrast are small relative to the brightness steps in the 0–245 DN brightness scale we have selected. To make the detail visible we need to increase the contrast in the light and dark parts of the image while leaving the mid-tones mostly unaffected. The way to do this is with the highlights and shadows sliders which operate

only on the light and dark parts of the image. Reducing the highlights keeps the white point we set (245 DN) but increases the contrast of the light parts of the image thereby making any detail that is present more visible. Similarly, increasing the shadows slider keeps the black point we set (0 DN) but increases the contrast of the dark parts of the image.

If you would like a deeper understanding of all this, take a look at Fig. 3 which shows how the scene exposure is transformed to the brightness values you see on a computer screen.

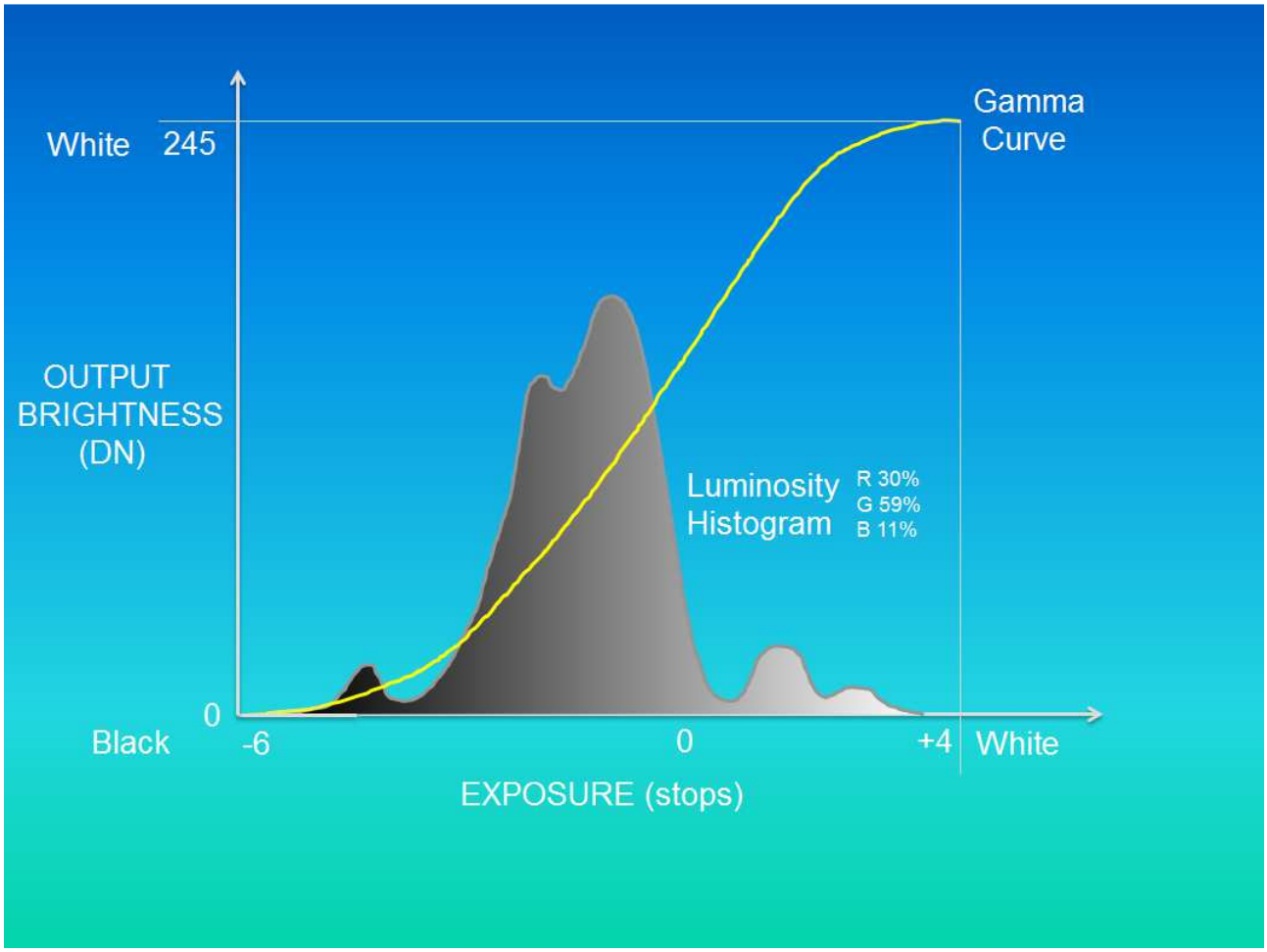

Fig. 3. The relationship between the input image brightness and the output viewed on a computer screen is governed by the shape of the gamma curve and the luminosity histogram. The local slope of the gamma curve is proportional to contrast and adjusting the RGB parameters defining the histogram changes the white balance and saturation.

The objective is to create an image on your screen with colours and intensity that looks like the original scene. The transformation is complicated by the fact that the human eye perceives the detail differently depending upon the image brightness and colour and the image is recorded with 12–14 bits but is compressed and output with 8-bits per colour channel. All of this is taken account in the transform represented graphically in Fig. 3. It summarizes a lot of interesting science but the key point for our present discussion is the slope of the gamma curve. Remember that contrast is proportional to the local slope of the gamma curve. So if you want to reveal more detail in the whites, then you need to prevent the gamma curve from rolling over to form a 'shoulder'. To achieve this you need to decrease the highlight slider; it has the effect of straightening out the shoulder to increase the local slope of the curve and therefore the contrast of the whites. The higher contrast will enable more detail to be revealed. A little sharpening will

finish the job and you will have achieved what Canon call ‘Fine Detail’ picture style and what will cost you good money to achieve with third party plug-in ‘detail extractors’.

A practical example of detail extraction in the blacks and the whites is shown in Figs 4(a–b). Fig. 4(a) shows the image with the standard gamma curve, like in Fig. 3, which favours mid-tone contrast. Fig. 4(b) shows the image after shadow and highlight contrast has been increased at the expense of some mid-tone contrast.

Fig. 4(a). An image displayed with a ‘standard’ gamma curve.

Fig. 4(b). The same image with the gamma curve modified using shadow and highlight sliders to recover more detail from the blacks and whites.

When making lighting and colour adjustments, there is a temptation to adjust all the sliders available without really understanding when it is appropriate to use these tools. The temptation is great with Adobe software where there are many adjustment sliders with which to play. Some of the tools are highly specialized and rarely required. Their inappropriate use often results in improbable lighting effects that make an image look unnatural. A common mistake is to increase the global contrast of an image; it sounds like a good idea until you understand exactly what this means. It has the effect of increasing the mid-tone slope of the gamma curve, and hence mid-tone contrast, while reducing the contrast of the blacks and whites (conservation of contrast) causing them to block up, the opposite of what we usually want to achieve, and it makes the light appear harsh.

None of the lighting adjustments discussed are difficult to do, and they should be a routine part of your post-processing workflow. If you are shooting in RAW, these global lighting adjustments should be made before RAW conversion. If you are shooting JPEGs, then use the Levels dialogue box and shadows/highlights sliders found in Photoshop and similar software.

Part 2 of this article will appear in the August 2015 Newsletter.