

## Basic Camera Settings for Bird Photography. Part 2: Setting Exposure – Glenn Pure

In the first part of this article, in the October 2018 newsletter, I covered basic camera setup for bird photography including basic exposure settings. I promised a second, more in depth discussion, on setting exposure parameters. Here it is ...

Choosing the best exposure parameters involves striking the right balance between shutter speed, aperture and ISO sensitivity as they all affect exposure. Let's go through these one at a time.

### Shutter Speed

Shutter speed is probably the simplest of the three. It controls how long the shutter is open and therefore how much light gets to the camera sensor. It is usually measured in fractions of a second. In most cases, you will want to go as fast as you can to minimise the chance of blur caused by the camera or subject moving while the shutter is open: the less time it is open, the less chance of any blur. Of course, some artistic effects can be created by deliberately introducing blur from slow shutter speeds, but I'm not covering that here.

In practical terms, what speed should you use? It's possible to get sharp photos at very slow shutter speeds, as low as 1/30 second with a 400mm lens. With the image stabiliser system turned on, good camera holding technique (or better still resting against a solid object or mounted on a tripod) AND a subject that is quite still this is achievable. But if you find yourself forced into such a situation, take lots of shots as many of them will suffer blur and the 'keep' rate will be quite low. I usually try to work at a minimum of 1/160 second and preferably a lot faster if possible. But the same principles apply as to using really slow shutter speeds: the slower the speed, the more rejects due to blurring. If you have an unsteady hand or a longer focal length lens (600mm or using a teleconverter), you may well need to start at much faster shutter speeds than 1/160 sec to get acceptable keep rates and minimal blur.

Photographing moving birds will demand even faster shutter speeds. Birds in flight will typically require 1/2000 second or faster, but it may be possible to get away with slower shutter speeds in some situations, especially with larger birds with more graceful motion. In such cases, speeds as low as 1/500 sec can work provided you are able to pan with the bird's movement. Again, take lots of shot in such cases as there are bound to be more than a few rejects.

### Aperture

The second parameter is aperture and is a bit more complicated. Aperture controls how much light gets to the camera sensor through changing the size of the iris opening in the lens. You may know of this setting as the f setting of the lens. Somewhat counterintuitively, a larger number like f22 means a smaller aperture and less light reaching the camera sensor than, say, f5.6. The iris in your own eye works in much the same way. When you move into a brightly lit situation, the iris gets a lot smaller to reduce the amount of light getting to your retina. The difference with a camera is that since shutter speed also affects exposure, it's possible to take photos in bright light and wide open aperture by using fast shutter speeds and vice versa. Your eyes don't have the equivalent of a shutter for controlling exposure.

Aperture also has another effect that is quite important to photographers: the smaller the aperture of your lens iris (larger f number), the larger the *depth of field*.



*Figure 1a*



*Figure 1b*

*These figures show the effect of depth of field. Both were taken on my Canon 80D with EF 100-400mm Mark II lens at 400mm. Fig 1a settings were 1/160 sec, f5.6, ISO 1600; Fig 1b settings were 1/60 sec, f9, ISO 1600. Notice how the shot at f9 shows the background less blurry and with more contrast. Closer inspection shows the back of the bird and feet dropping out of focus at f5.6 but in focus or much sharper at f9. The perch is also sharper at f9. Which is better? I prefer more blur in the background so would probably go closer to f5.6 for this shot.*

Unlike your own eye which will scan a scene and adjust focus continuously to keep everything you look at sharp, your camera takes a single photo of an entire scene at one moment. If distant objects are in sharp focus, close objects may be out of focus and vice versa. Depth of field is the measure of how much will be in focus. If you use a smaller aperture (larger f number) more of the scene behind and in front of the focus plane will be in sharp focus. This is quite important for bird photography because we are normally using telephoto (long focal length) lenses. Depth of field gets shallower as focal length gets bigger. This means that much less in front of and behind the focus point will be sharp when using a typical bird photography lens. For example, if I had a lens with a focal length of 40mm on my camera and set the aperture to f8, then set the focus on a subject 7 metres away, everything from infinity (the most distant object visible) to objects as close as about 3.5 metres from the camera will be in sharp focus. If, however, I tried the same settings on my 400mm focal length bird photography lens, also focussed on a subject 7 metres away, the only things in sharp focus will be those between 7.07 metres and 6.93 metres from the camera – a depth of field of just 14 centimetres.

There are handy depth of field calculators online. Here's one of many:

<https://www.photopills.com/calculators/dof>

Many of these calculators ask for your camera type or model. Even though depth of field is a physical characteristic of the lens and it doesn't matter what camera your lens is mounted on, the **perceived** sharpness of an image is dependent on the camera type and specifically its sensor size (crop sensor or full frame, for example). This is why these sites usually ask you for your camera details too.

When choosing an aperture for photography, most of us will want to get as much of our subject (or subjects) in focus so will need to select a suitably small aperture. Bear in mind that it may be impossible to achieve this for larger subjects or those at close range, even using the smallest aperture (largest f number) on your lens. I used to try getting as close as possible to my bird subjects to get high-impact, frame-filling close-ups of birds. I am now more cautious about doing that because, even for small birds, if too close, it may be very difficult to get all but a small part of the bird in focus. Of course, some wonderful artistic effects can be obtained by doing this but that's not something I'm going to cover here. It's also usually good practice to have as much of the foreground and background as blurred as possible. This suggests more wide open apertures that produce low depth of field. You can begin to see that choosing the right aperture can get tricky. The best suggestion is to try different apertures and get lots of practice in. Also, don't be afraid to look at the depth of field calculators to get a feel for how much this varies with aperture for your particular lens.

Is there an ideal starting aperture for bird photography? I certainly don't claim to have mastered this but if I was going to make a suggestion, for a 400mm lens as an example, I'd suggest somewhere in the range f6.3 to f8 as a 'happy medium'. I take a lot of my shots at f7.1 but can be accused of not changing this as often as I should to suit different situations. For longer focal length lenses (eg 600 mm), err more towards f8 and for shorter focal lengths (300 mm) more to f6.3 or even wider open than that.

## ISO Setting

The final factor affecting exposure is the ISO setting. Think of this like the volume control on your music player. Turning up the ISO simply amplifies the signal coming from your camera's image

sensor making it stronger (the music equivalent of louder). However, when the ISO is turned up too much, unwanted things start to happen. In the days of vinyl records, turning up the volume also amplified all the defects, scratches, pops and noise in the recording. The signal coming from your camera's sensor is by no means perfect and can suffer significant background noise too; so turning the ISO up will make those defects much more apparent. The most obvious of these defects is 'noise', typically in the form of fine speckling that can be seen in some digital photos taken at higher ISO settings (like film grain in the old film technology days). It's a lot easier to see this in areas of even tone that lack detail, such as out-of-focus backgrounds. Some people don't mind this or even like it, but in nature photography it is generally poorly received and I'd recommend dealing with it by using noise reduction filters and tools in post-processing, because sometimes you will have to turn the ISO up to get an acceptable shutter speed and aperture combination.

## Getting Exposure Right

So shutter speed, aperture and ISO work together to give you a correctly exposed image. That raises the question of what does 'correctly exposed' actually mean? The answer isn't as simple as you might expect. First, it's necessary to step back and ask what specific tonal information must be recorded when a photo is taken. Because the human eye scans a scene and automatically adjusts for lighter or darker areas as it scans, one thing we usually perceive is detail in both highlights and shadow areas. Ideally, we want to have the same in any photo we take so when it comes to processing that later, we can extract detail in both dark and bright areas. In general, detail in highlights or bright areas is particularly important, especially if it is part of the bird featured in your photo. Detail in shadow areas is also good to have but less critical as our vision tends to be less effective at seeing that. Also, most people's attention is drawn to the bright areas and highlights in an image.

A camera's exposure meter is set by default to show the settings needed to get a mid-grey exposure (half way between pure black and pure white). This is often a good approximation of the exposure needed to get highlights and shadows exposed so that they aren't *clipped* or *blown*. First I should explain those terms. Highlights are blown when they are pure white and lacking in any detail; shadows are clipped when pure black and lacking detail.

However, exposing for mid-grey will not work in some situations. The reason is that cameras, at some point on the brightness and darkness scale, will no longer be able to record any differences in light intensity that might exist in the original scene. While cameras are getting better, this range has limits (technically, it's called the *dynamic range*). The situations where exposing for mid-grey may not work includes subjects with lots of white or black, or that are in a mix of shadow and direct sunlight. Even with correctly exposed mid-tones, it's quite easy to get blown highlights and clipped shadows. I'll get to how you can deal with that in a moment but first, let's look at how to get the initial mid-tone exposure set as a starting point from which you can then check for problems.

Most cameras should have an information display in the viewfinder that not only shows current settings such as aperture, shutter speed and ISO but the current exposure reading from the active metering points in the viewfinder. As mentioned in the first part of this article, I use the centre metering point alone for metering in most situations. I know other photographers use the centre zone of points, which might consist of up to 9 or more metering points clustered in the centre of the frame. By moving that point (or zone) over the subject and the surrounds, I can see the



metering change via an indicator bar moving back and forth along the exposure scale in the viewfinder. For my camera, this shows exposure from minus 3 EV (exposure value) to plus 3 EV. By the way, EV is a strange scale: a shift of one EV means a doubling (or halving) of the light reading. When the indicator bar is sitting under the zero mark on the exposure scale, it means the metering point is over an area that will be recorded tonally mid-grey, that is, half way between pure black and pure white.



*Figure 2. Top LCD panel on my Canon 80D which shows the exposure scale indicator (bottom) along with current exposure settings. The same information is presented at the bottom of the viewfinder in the camera (but I can't photograph that easily). The current exposure indicator, which is only active when the shutter button is half pressed, shows I'm currently over-exposing by one and a third EV (vertical bar under the exposure scale).*

When the camera is set to one of the auto exposure modes (for example, shutter speed priority or aperture priority), the metering indicator will always sit on zero but the aperture or shutter speed will vary depending on the light reading the camera is seeing as you move the metering point or zone over the scene. Therein lies a problem with these 'auto' modes. If the metering point happens to be over a part of the image that is overly bright or dark when the shot is taken, an incorrect exposure will usually result. So it's necessary to try to lock in the exposure settings just before the shot is taken. My Canon 80D has a button cryptically marked '\*' that does that and holds the exposure reading for a number of seconds to allow time to recompose and take the shot. The exact way to lock exposure will vary between camera models and manufacturers. To get the correct exposure in these situations, I must point the centre metering point over a part of the subject or scene that I want to look mid-grey in tone in the final image, then press the \* button before recomposing and taking the shot. However, it's necessary to re-do that before every shot and I personally find that quite annoying, so instead I set the exposure manually. This involves setting the mode dial to manual exposure then running the centre metering point in the viewfinder over a part of the scene that I want to look mid-grey. I then set shutter speed, aperture and ISO so the metering indicator is sitting on zero in the viewfinder exposure scale. Provided the lighting conditions of my subject aren't changing significantly, that should give me a good initial setting. Of course, if lighting is changing (cloud coming and going; subject moving in and out of shadows), I have to keep re-checking and adjusting exposure. No metering strategy is perfect – chose the one that works best for you.

The next critical step is to take a test shot of the scene – ideally with your subject bird if it is being cooperative. The image should then be reviewed on the camera's replay screen. Just looking at the shot will give you some idea but it's usually not enough. Many cameras have built in tools to help work out if there are any clipped shadows or blown highlights. One of these is the histogram display. I personally never use it though and am not going to cover it here. Instead, I use the 'blinkies'. This is a setting in many cameras that can be turned on to show any completely over-exposed or 'blown' parts of an image. For my camera the setting is called Highlight Alert and the 'blown' areas blink black and white. In terms of what I explained a little earlier, these are the parts of the image where it's simply too bright for the camera to record any tonal differences or detail. They will all be pure white in the final image with no way of ever recovering any detail in those parts later. Using the 'blinkies' I can quickly see if I have a problem and if it's in part of the scene that's going to cause grief. If so, I will reduce the exposure a little and re-check for blinkies. Unfortunately, there are no 'blinkies' for clipped shadow areas, at least on my camera, but they are less of a worry than blown highlights usually.

Even if your shot looks a bit washed out and over-exposed, provided the critical highlights aren't blown and blinking black and white, the shot will process just fine and produce excellent results once you've got it home on your computer. In fact, for those interested in more advanced techniques for exposure, experienced photographers actually aim to over-expose their shots or 'expose to the right' (ETTR), to the point just before the 'blinkies' indicate a problem. This helps to both control noise and record better detail in shadow or darker areas. Be aware though that in some situations, for example white birds in direct sunlight, it might actually be necessary to under-expose to avoid blowing the highlights.

While setting exposure only involves three parameters, it is critical to good photography to understand the trade-offs involved in balancing the three. Each situation will be a little different. So practice and experimentation, based on understanding the principles as outlined in this article should help you get on top of this.