The Zone System was created for use with negative film—black-and-white negative sheet film, to be specific. The mantra of the Zone System is "expose for the shadows, develop for the highlights." There are a few reasons for this.

If shadow areas are underexposed, they melt away into undetailed black holes. Given the nature of the film, however, some highlight detail can be recovered. Negative film is more forgiving of slightly increased exposure than decreased exposure. If you attempt to wring detail out of underexposed shadows, what happens is mostly that dark tones become lighter shades of gray and grain becomes more visible, as we discussed in chapter 1.

The opposite is true of slide film. With slide film the mantra was "expose for the highlights." Increased exposure would "blow out" highlights and render these areas as undetailed white blobs. Our eyes are naturally drawn to lighter areas of an image, so overexposed highlights would distract the attention of the viewer. Trying to tone down highlights would just create unappealing areas of blank gray.

Where does digital photography fit in? It's a positive medium, so does that mean you should slightly decrease exposure to protect highlights? Changes in sensor technology have introduced a minor shoulder at the top of the digital response curve, and in-camera JPEG processing applies a tone curve to create more pleasing contrast, but the digital response curve is still linear.

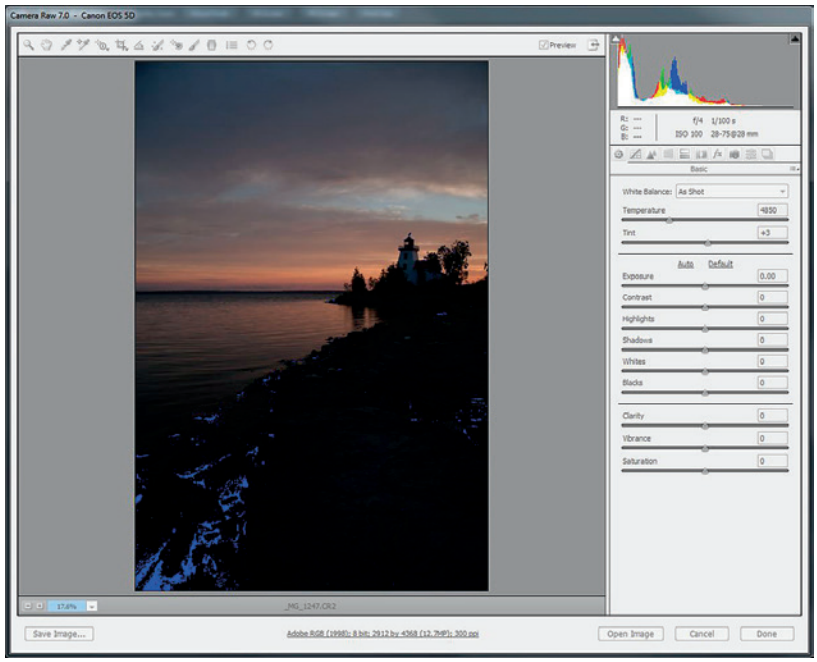
In the early days of digital, a bias toward slight underexposure was recommended. Before the use of anti-blooming circuitry on sensors, overexposure of one pixel could spread or "bloom" into adjacent pixels, giving the area a washed-out appearance. Anti-blooming circuitry effectively shuts off the pixel as it reaches full exposure so that it won't accept any more light, thus avoiding blooming. Even with this, overexposed highlights are not desirable and detail cannot be recovered later.

The problem photographers encountered when even slightly reducing exposure was that digital noise is more evident in underexposed areas of an image. Increasing exposure or brightening the image in the digital darkroom makes noise even more visible.

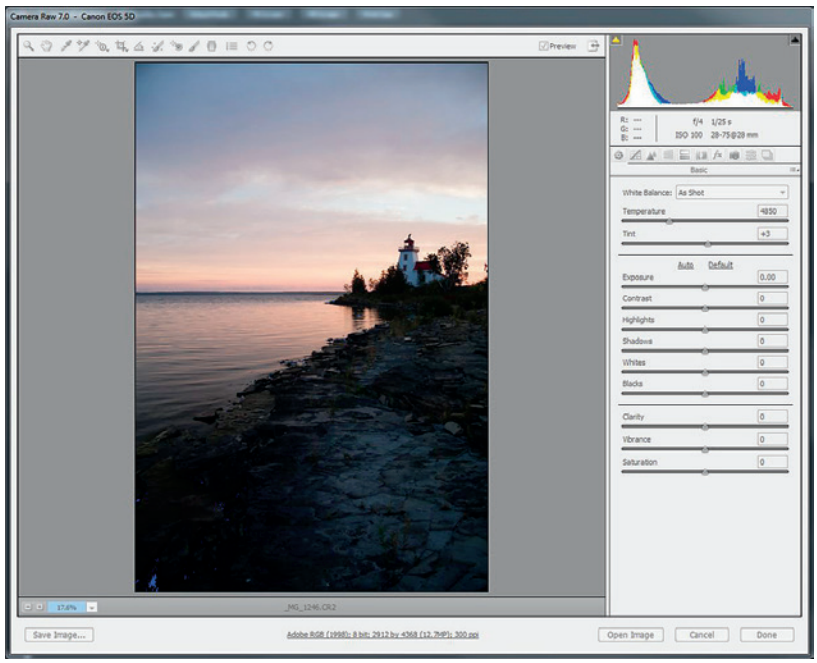
As sensors improve and photographers learn more about the limits of increased exposure in digital cameras, they were surprised to discover that there is a good deal of wiggle room after all. An image that appears to be overexposed on the LCD of the camera—complete with blinking highlights—can actually have full highlight detail available.

Figure 3.26 shows an exposure that's slightly reduced to protect the highlights. This is a screen capture from ACR with the underexposure warning turned on, which shows up as the blue shaded areas. The blue shaded areas lack information and will exhibit a high degree of noise if lightened.

Figure 3.27 shows a normal exposure of the same scene. In ACR, the Blacks slider has been moved slightly to the right to reduce the appearance of underexposure in the brush at the lower left. If we look closely at the shadow areas of the image, we can see that there's still quite a bit of noise in the shadows. How do we deal with it? Take note of the histogram for this shot.



◀ *Figure 3.26: Underexposure warning in ACR*



◀ *Figure 3.27: A normal exposure in ACR*

Figure 3.28 shows one way the shadow noise can be dealt with. In this image, the exposure was increased one stop from the previous image. The screen capture from ACR shows what looks like overexposure in the area behind the lighthouse. Note that I didn't say the shot *has* a one-stop overexposure, only that is *looks* like an overexposure. Over- and underexposure are mistakes. Increasing or decreasing exposure from the meter reading is a purposeful action, not a mistake.

Is there really overexposure in the clouds? No, there isn't. That's the wiggle room mentioned earlier.

In the version of the image shown in figure 3.29, an exposure correction of −1, a Highlight correction of −25, and a Whites correction of −35 were applied. Last, a Blacks correction of +30 was applied to eliminate the small bit of underexposure in the brush in the lower left corner.

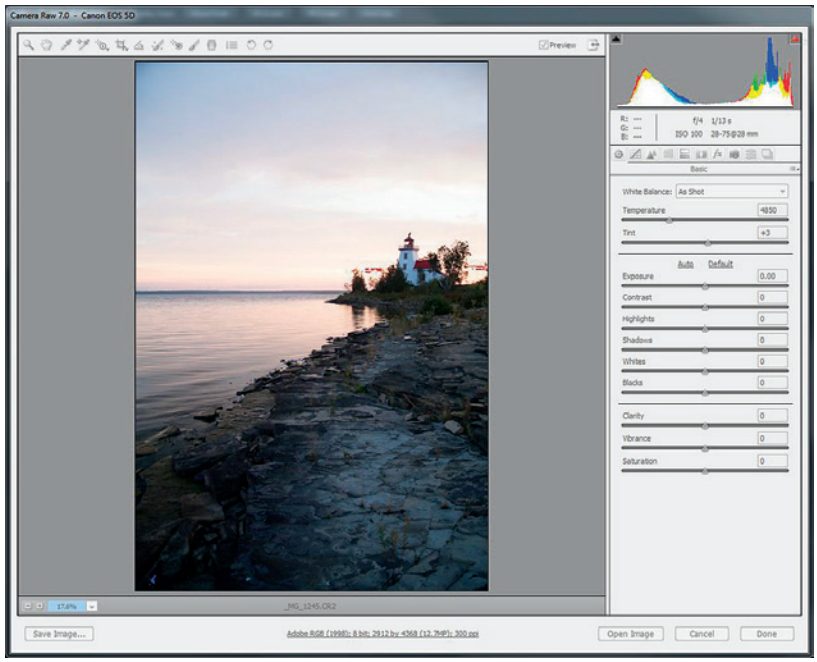
What do we see now? No overexposed highlights and no underexposed shadows. The shadows are dark, but that's to be expected. What we have is an image that looks very much like the normal exposure but is actually better.

Expose to the Right

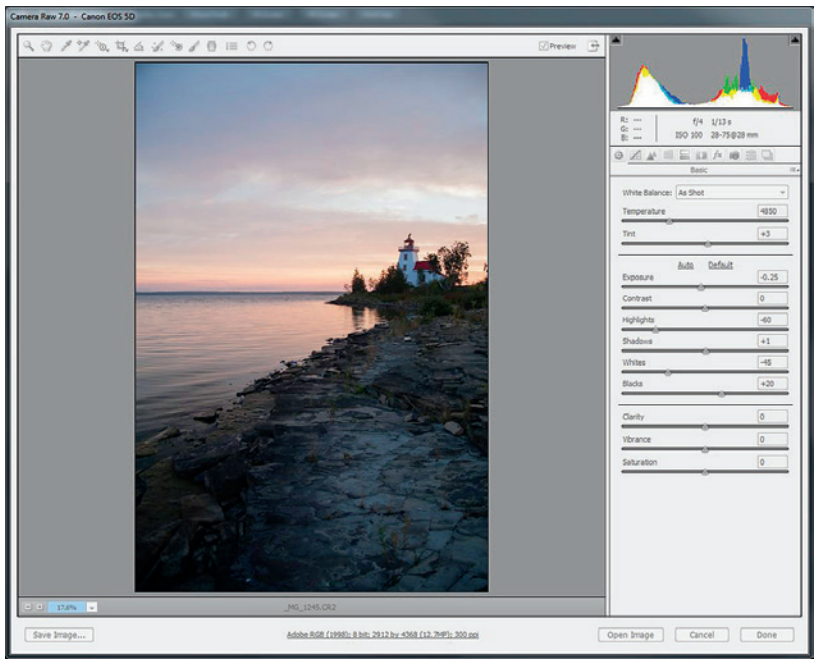
This technique is called Expose to the Right (ETTR). It's a controversial method of digital exposure. It's probably more controversial than the Zone System has been over the years. There are some who suggest that ETTR is the only way to expose for digital in all situations. In my opinion, that is flat out wrong.

ETTR *can* work in a few situations: (1) when the brightness range of the scene being photographed fits within the brightness range of the sensor, and (2) when you're shooting at the base ISO of your camera. If either of these conditions is not true, ETTR does not apply. We'll examine techniques for dealing with situations outside these conditions in chapter 6. If you're shooting at an ISO setting above the base ISO, you can usually achieve the same results as with ETTR by simply dropping the ISO setting down equivalent to the increase in exposure. For example, if you're shooting at ISO 800 and increasing exposure by one stop for ETTR, you can move to ISO 400 and expose normally to get the same results. With a few cameras, it can be beneficial to shoot ETTR above the base ISO. Even then, it will typically work only for the lower part of the ISO range. Testing with your camera will help you determine whether you can effectively use ETTR at higher than base ISO, and how high you can go and still have the benefit of ETTR.

Why did I say the ETTR shot looked similar to the normal exposure but was actually better? Because the ETTR shot captured more light. More light means more signal. More signal means a better signal-to-noise (SNR) ratio and less evidence of noise in the shot. You'll need to do some testing with your camera to determine how much you can push the exposure and still have recoverable highlights. You'll also have to experiment with the in-camera contrast, saturation, and sharpness settings to optimize the LCD image for determining whether you've gone too far with ETTR. The preview image on the back of the camera is actually a JPEG rendered with the in-camera settings, not a preview of the RAW image. By adjusting the in-camera settings, you can get a closer match to what you see when you open your image in ACR.



◀ *Figure 3.28: One stop increased exposure*



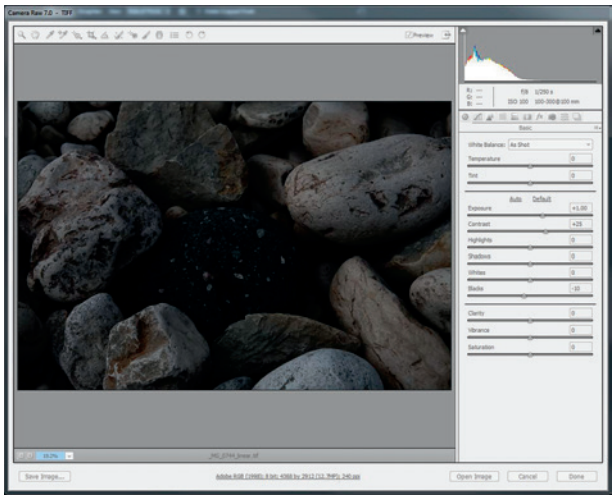
◀ *Figure 3.29: After exposure corrections*

Most DSLR cameras on the market today are able to generate 14-bit RAW files. These 14 bits provide 16,384 levels of information. Today, DSLRs can also capture about 11 to 13 stops of light. Half of the 16,384 levels of information (8,192) are contained in the uppermost stop. Half of that again (4,096) is contained in the next stop. This progression continues down to the last stop in the shadows, which, in a camera with a 12-stop brightness range, contains only 4 levels of data. With so little data—so little signal—in the lower stops, it's easy to see why noise is more prevalent in the shadow areas of an image. By pushing the exposure to the right without overexposing, thereby capturing more levels of data, we improve the SNR and reduce the evidence of noise even after making our exposure corrections. Moreover, we will end up with more distinct steps of gray tones in the shadows. The linear representation of a digital capture is shown in figure 3.30. Notice that at the left end, you really can't even distinguish between the stops any longer. The step wedge in chapter 1 showed grayscale values for zones. The two step wedges are very different in appearance. That step wedge in chapter 1 is what we have after applying a gamma correction to spread out the brightness values more evenly.

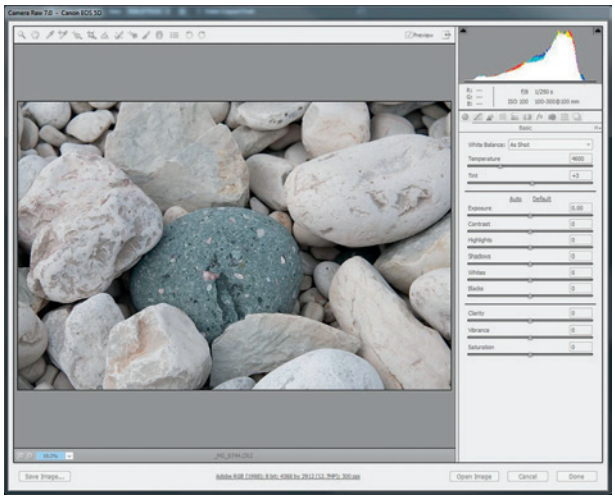
▶ *Figure 3.30: Step wedge representing linear digital capture*

In Photoshop or another image editing application, a linear image would look very dark. The reason is that our computer monitors are not linear in the way that they display information on-screen. Computer monitors have a built-in gamma curve with a concave shape. Think of opening the Curves panel in Photoshop and pulling the curve downward. This would roughly replicate the gamma curve of a monitor. In figure 3.33, I have done just that in the gamma-corrected image you see in figure 3.32. Notice that it looks very much like the linear image in figure 3.31. The gamma correction applied to a camera RAW file or an in-camera JPEG is the inverse of the monitor gamma curve. The two curves offset each other and bring our on-screen display back to a linear condition.

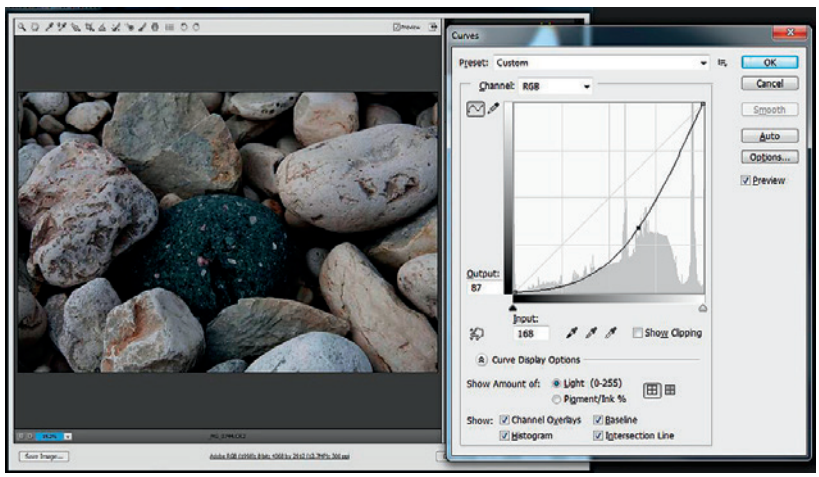
ETTR is, in my opinion, a holdover from the film Zone System. It's a digital version of increasing exposure and contracting development. Just as that method reduces the evidence of grain in film, ETTR reduces the evidence of noise. This is most helpful in shadow areas, particularly if we want to brighten these areas. It's another benefit of digital as compared to film. With digital, our shadows are not locked in at the time of exposure as



◀ *Figure 3.31: True linear image viewed in ACR*



◀ *Figure 3.32: Gamma-corrected image in ACR*



◀ *Figure 3.33: Gamma-corrected image altered to replicate linear gamma image*

they were with film. We can lighten or darken shadows, midtones, and highlights.

The images in figure 3.34 illustrate this benefit. The one on the left is a 100% crop of a shadow section of the normal exposure. The one on the right is the same crop of the ETTR image.

In the first image, the noise in the shadow areas is much more evident and unappealing. This would definitely show up in a print. In the second image, the ETTR image, noise is significantly reduced and would not be visible in a print of the same size. To make the illustration clearer, I increased the brightness of both images by the same relative amount. This brightening also shows how shadows can be lifted in an ETTR image without making noise visibility objectionable.

▲ *Figure 3.34: Normal exposure (top) shows more noise. The ETTR image (bottom) has less visible noise.*

Important note:
It is important to keep in mind that if you're going to use ETTR to expose for digital capture, you *MUST* make your exposure adjustments to the RAW image in your RAW converter before employing the Digital Zone System discussed in chapter 5.

Chapter 4
Tools of the Digital Zone System

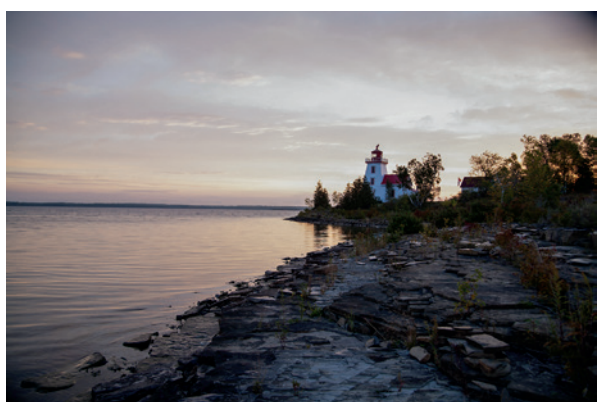
Before getting into the meat of the Digital Zone System, let's take some time to walk through the main tools that are used with this editing methodology. In this chapter, I will outline the various shooting and editing tools that are recommended, and I'll provide an explanation of what each does and why I suggest it. My hope is that ACR will eventually be fully integrated into Photoshop. Until that happens, we'll have to work with the two components of Adobe's software separately.

Camera and File Format

If you're going to use ETTR, you have to shoot RAW. JPEG simply does not provide the flexibility to adjust exposure, white balance, and other variables that RAW does. The images shown here illustrate the differences between RAW and JPEG. The first image (figure 4.1) is the RAW file out of the camera. The second image (figure 4.2) is the RAW file after adjustments made with ACR's Basic panel. Figure 4.3 is a JPEG of the RAW file with the same adjustments. With the RAW file, it was possible to pull back more detail in the sky, particularly above and directly behind the lighthouse. Its colors are better, and the overall image has more life than the edited JPEG. It should be pretty clear that RAW is the preferred file format for use with the DZS. There may still be times to shoot JPEG, but not when you want to use the DZS for editing.

▲ *Figure 4.1: Unaltered RAW file*

▲ *Figure 4.2: RAW file with adjustments in ACR*



▲ *Figure 4.3: JPEG file with the same adjustments in ACR*