

Figure 1 — Inside the RAW editor



nce a digital camera has captured light rays from an object on its photo-electric elements, a great deal of computer processing has to occur to provide an accurate rendition of the shape and colors of the object.

The color sensitivity of the chip differs from the color sensitivity of the human eye. The system also has a narrower dynamic range of sensitivity between the lowest intensity of the light it can output, and the highest it can register without being overloaded.

Colors also vary with the light that shines on them. The human eye automatically corrects for that, but the camera has to adapt depending on whether the ambient light is sunny, overcast, incandescent, fluorescent, or flash.

Good digital cameras do an astoundingly good job converting the signals received into a natural photo. Once it has done its job, most cameras compress the image into a much smaller file for storage in the common format, JPEG, that greatly reduces the file size, with a significant loss of data. It also reduces the color depth from 16 bits (or more) as shot to 8 bits, another loss of information. For most everyday use the resulting pictures are perfectly acceptable.

If you are not totally satisfied with the picture as the camera produced it, there are a number of computer programs that allow you to modify the picture in many ways to fit your purpose. Often that involves cropping, brightening or darkening, increasing or decreasing color saturation, and sharpening

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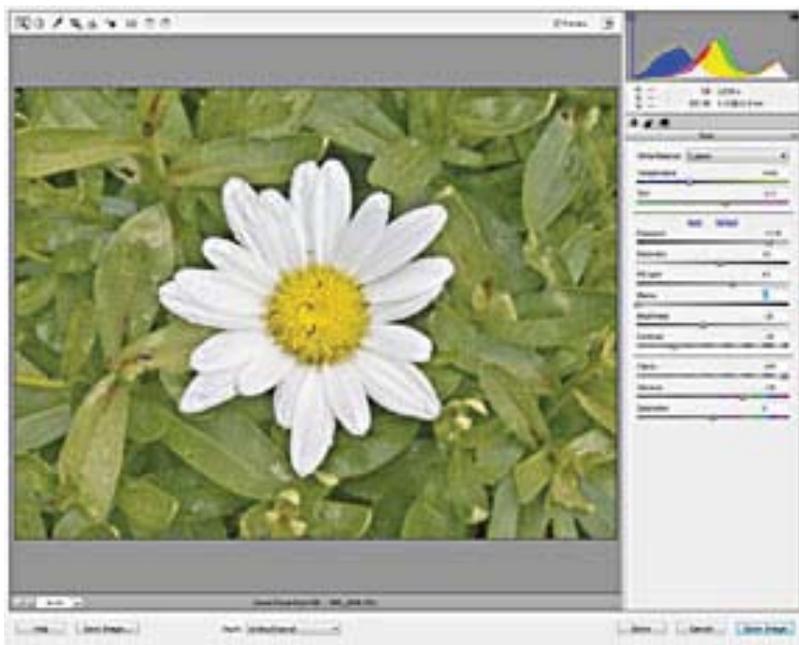


Figure 2 — Color optimized in RAW editor

of the image. Any number of programs are available for that, but I want to concentrate on Photoshop Elements (PE), especially version 9 that I have available, the lower-cost version of the professional standard bearer, Adobe's Photoshop.

Sometimes the improvements possible with even PE are not able to make up for shortcomings of the photo. The dynamic range, i.e. the difference between the brightest and the darkest part of the image may be too great, or the color of the ambient light is wrong.

There are ways to improve such shortcomings to some extent in the editor, but because so much of the original details of the picture have already been discarded by the camera, the options are limited.

Some of the more expensive cameras, even pocket-sized ones like my Canon Powershot S95, optionally save the image with a minimum of editing and without discarding any details, including the full color depth of 16 bits, versus the 8-bit depth of JPEG images. Such images are generally referred to as RAW files.

RAW is not a standard format and may vary between makes, and even individual models, of digital cameras. RAW pix taken with my older Canon DSLR camera worked fine with PE9, but pix taken with my newer Canon S95 in RAW format did not work at first. I had to download a newer version of the RAW editor from the Acrobat web site. RAW files may have different extensions, depending on the make of camera. My

Canon S95 uses the extension CR2. RAW files loaded into the PE Editor open in a special RAW window (Figure 1). Editing in the RAW editor replaces the preconditioning normally done by the camera. After the RAW editing is done, the picture is transferred to the regular editor for final optimization.

At the top of the RAW editor window are mostly familiar tools. The eye dropper, when touched on a white or neutral gray object, corrects the ambient color of the image. The angle icon allows straightening an image if the camera was tilted. The rectangle tool allows cropping the picture. It should be noted that none of the changes made in the RAW editor affect the original image file. Changes are listed in a separate file and combined with the original when the picture is subsequently opened in the regular PE Editor.

The menu column at the right is where most of the work takes place. At the top is a histogram that shows the range of color intensity that is within the limits of the electronic chip. Anything to the left is too low to be registered, anything to the right is overloading the electronics. Most of the tools are intended to change the histogram so that all the colors are evenly spread out, as much as possible, without clipping.

First you want to decide on the lighting color (tempera-  
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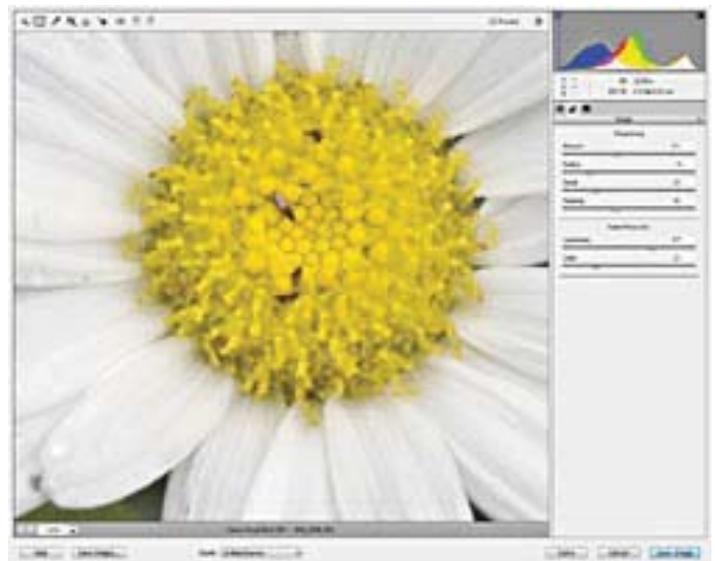


Figure 3 — Using Detail In RAW editor

ture) of the image, using the options under the White Balance menu, using the aforementioned eyedropper, or manually moving the two color sliders.

The picture shown is severely underexposed, as shown by the clipping on the left side of the histogram. The Exposure slider helps to correct that. If some of the colors slip over the right side of the histogram, they can be recovered with the Recovery slider.

The left side of the histogram can also be shifted to the right with the Fill Light slider. Notice that some of the numerical parameters are already preset in anticipation of expected corrections needed when the file is loaded. Those are the ones used by the camera by default in processing pictures.

Figure 2 shows the result of optimizing the image for color. Increasing the exposure and sharply increasing fill light made it necessary to reduce the overall Brightness. Contrast was reduced to bring up the left side of the histogram. Increasing the Clarity and Vibrance restored much of the contrast and color. The drastic changes made to this image were necessary because of its poor initial quality.

After the pre-processing all image data originally present in the RAW file have been retained and made available for further editing.

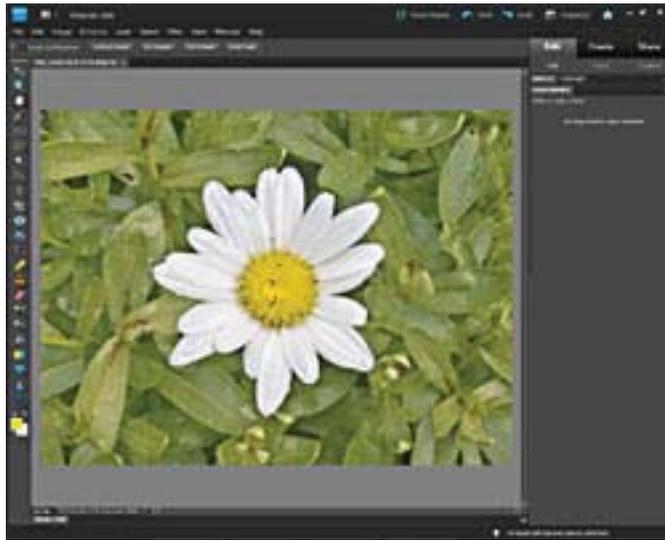


Figure 4 — In Photoshop Elements editor

Notice that the data now cover most of the width of the histogram. A small amount of clipping on the left, originating in the heart of the flower, is acceptable since it won't be noticeable.

To sharpen the image, we change to a different page of the RAW editor, by clicking on the small icon with the two rectangles at the top of the menu. The menu heading changes from Basic to Detail and a new set of parameters shows up (Figure 3).

First of all, increase the size of the image to 100% so you can see what you are doing. Make sure the screen shows a significant part of the image to be sharpened. In this case I zoomed in on the heart of the flower.

The first three sliders are intuitive, but the Masking slider needs explanation. Sharpening the image with

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Figure 5 — The Final Result



the Amount slider tends to cause mottling to show up, especially in the darker parts of the image.

The Masking slider masks the smooth portions of the image but not the outlines. To use the slider, hold down the Alt key while moving the slider to the right. The initially blank screen gradually darkens until only the outlines are barely visible. Let go of the Alt key and use the Amount slider to only sharpen the outlines, without affecting the smooth portions.

Even so, some mottling will probably show up when you apply a healthy dose of sharpening. The Luminance slider is designed to reduce the mottling. Don't overuse it, or your picture will start looking pasty. Sometimes sharpening also introduces colored mottling. The color slider can reduce that.

By now you have done as much as you can in the RAW editor and you'll finish the job in the regular editor. Transfer the image by clicking on Open at the bottom right. The RAW editor closes, and the picture appears in the regular PE editor (*Figure 4*).

It may still be in 16-bit format, if it was an original RAW image, and it needs to be reduced to 8 bits at this point. Click on Image ... Mode...and select 8-bits.

You now have a head start in the PE Editor for adjusting whatever else may be needed. The last step should be resizing the image to suit your needs. Remember that the original RAW file was not changed, so you can always go back later and do it over again, if needed. *Figure 5* shows my final result.

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## tips for RAW editing

- **If** you only have pictures in JPEG format, you can still load them into the RAW Editor by using “Open as...” and specifying the RAW format from the submenu. That way you still have access to the advanced tools of the RAW editor, although you'll have less of an image to work with.
- **I save** all my photos by default in both RAW and large JPEG formats, using that option with my camera. The file sizes may be large, but even with a modest 2GB chip I can store many photos before they must be offloaded to the computer.
- **RAW** editing can usually be done in a minute or so, once you get the hang of it. The photo used in this article was intentionally poorly shot to demonstrate the power of extreme RAW editing. With properly exposed photos, RAW corrections are minimal and quickly done. The RAW option is not available if you use the camera in automatic mode.
- **When** viewing a photo on the camera screen, with many cameras there is an option to see technical details, including the histogram. If the histogram looks very one-sided, you may be able to change the camera settings and shoot the picture again, if possible.