

Eight tips to ensuring good output.

file-prep *and* color-management

Roses' Shadow, © Andrew Darlow.

To achieve great prints from your files, you can wait for the planets to align, and say a few of your favorite magic words. Or, you can prepare your files in a logical way using a structured workflow and set up a color-management system that works to better control the color and consistency of your output.

Whether you are producing prints from scanned negatives, transparencies, drawings, digitally captured paintings, scanned 3-D objects, or digital photographs, the eight tips on the pages that follow should help make the process faster and easier. After all, the more you know about optimizing your images, the better the resultant output will be.

1 Sharpen with care and keep sharpening on a separate layer (or layers)

Some printer-and-media combinations will show artifacts or unnatural halos if images are sharpened too strongly, and others will benefit from aggressive sharpening. Either way, I recommend sharpening on a separate layer in Photoshop so that you can dial back the intensity (opacity) and tailor the sharpening for different printers, monitors, projectors, etc.



Above left, Photoshop's Layer Palette, showing how two duplicate layers of the background could be used as separate sharpening choices by enabling the eye—circled in red. At right, using the merge shortcut in Photoshop's Layer Palette to make a new layer comprising the layer contents that are below it.

To do this, duplicate your background layer, and then apply sharpening to it. By duplicating a sharpening layer, the effect of multiple sharpening layers can be viewed. If you have a multi-layered Photoshop document that you would like to sharpen without flattening the layers, there is a special key command that can be used in Photoshop to merge all the layers into a single layer: First target the top layer in the layer stack. Then, on Mac, press: Command + Shift + Option + the "E" key; on Windows, press: Ctrl + Shift + Alt + the "E" key. As with most things related to inkjet output, make test prints to determine what level of sharpening looks good to you.

Try sharpening using other options

2 Sharpening can also have the effect of adding noise, and PixelGenius offers a fantastic sharpening tool called PhotoKit Sharpener to help control the amount of noise in areas that you would generally not want sharpened, such as solid dark areas, while sharpening areas that contain detail. The software has options for sharpening prior to editing (called Capture Sharpening) and other options for sharpening based on a number of factors, such as your chosen output device. There are several excellent workflow PDFs on the PixelGenius website (www.pixelgenius.com) for the software.

Another tool worth investigating is Nik Software's Nik Sharpener Pro 2.0 (www.niksoftware.com), which has a very easy-

to-use interface, with the ability to sharpen or not sharpen by selecting different color ranges. I also came across a great review of "Fractal Sharpening," by Uwe Steinmueller; he describes a process using Noel Carboni's dSLR Fractal Sharpen Actions (<http://actions.home.att.net>), which is well worth investigating. And another plug-in suite that I learned about (and saw impressive results from) in a book by George DeWolfe is called Optipix, from Reindeer Graphics (www.reindeergraphics.com). The software includes sharpening plug-ins including Refocus, Safe Sharpen, Edge Enhancer, and Detail Sharpener. Reindeer Graphics also has a free "Select Edges" plug-in on its website that can make a dramatic difference in many images when used properly.

3 Add noise in Photoshop to create film grain in images

Adding noise to digitally captured or upsized images can often make them look less "digital" and more like images captured on traditional film. I first saw the power of this in a presentation by photographer and PixelGenius member Jeff Schewe,



Before and after effect of adding noise with Photoshop's Filter > Noise > Add Noise filter. The photo at right shows the settings that were used.



■ file-prep and color-management

who enlarged a file from a 3.1-megapixel Canon EOS-D30 digital SLR using Photoshop (prior to the built-in Bicubic Smoother option) to about 20 x 30 inches, added noise, then printed the image on an inkjet printer. The final print looked very natural—similar to what I would expect from a pro lab that makes digital or darkroom prints.

Following are the settings I often use when adding noise to images using Photoshop's noise filter (Filter>Noise>Add Noise)—Uniform, with Monochromatic checked. Photoshop's preview at 100% (1:1) will give you a good overview of what to expect, but to really see the effect, it's best to make test prints using different noise settings. You may be surprised how well "noisy" images onscreen look when printed. Noise should also be applied on a separate layer, just like sharpening.

4 Understand the benefits of working in 16-bit color or grayscale mode

Images can be scanned from film or processed from raw digital-camera files into 8-bit files (256 levels of gray per channel, e.g., RGB) or high-bit files called 16-bit in Photoshop, containing thousands of levels of gray per channel. Raw digital-camera files (unlike JPEG files) are not compressed or processed in the camera, and by shooting in a camera's raw format, significant adjustments can be made in contrast and color via software such as Photoshop's built-in Camera Raw, Adobe Photoshop Elements, Adobe Photoshop Lightroom, Apple iPhoto, and Apple Aperture.

Photoshop offers many of the same tools for editing 16-bit images as it does for 8-bit images, and editing in 16-bit can help reduce banding. Banding appears in images as visible bands of color or gray—often seen in a stair-stepped pattern. Gradients in skies and skin tones also tend to look smoother when adjusted in 16-bit color. Sharpening can be done when in 16-bit color mode in Photoshop, which can give images a cleaner overall look.

When printing to an inkjet, many drivers, plug-ins, and RIPs will allow you to print directly from the 16-bit file. It is important to note, however, that 16-bit files are twice the size of 8-bit files (assuming there are no extra layers), and in many cases, you will not see any discernable difference in your print quality between images that begin as 8-bit versus 16-bit files. Also note that your scans or digital camera raws need to originate in 16-bit color. You can't just change a file from 8-bit to 16-bit and expect it to magically gain the advantages of high-bit data. I personally think that when scanning black-and-white negatives in grayscale (one channel), 16-bit should almost always be chosen because grayscale images are more prone to visible banding, and the file size will still be lower than an 8-bit RGB file.

5 Learn the difference between calibrating and profiling

Calibrating a device, such as a monitor or printer, is different from profiling a device. In photography and digital printing, calibrating means to bring a device, such as a flat-screen monitor, to a repeatable operating state, usually with the expectation that it will maintain that state over days or months before having to be recalibrated. For example, a factory that makes plasma or LCD flat-panel TV displays will generally set all the individual units of a particular model to a certain calibrated standard, with the brightness, contrast, and color settings set to specific starting points. LCD computer displays are shipped to users in a similar fashion, with the brightness, contrast, or color-level adjustment set at specific default settings. A monitor can then be calibrated more accurately using various software or hardware tools.



The Displays System Preference Pane in OSX showing previously created monitor profiles. The steps for selecting a monitor profile are noted in red from one to three, and can be accessed by choosing System Preferences from the Apple menu. Clicking on the word "Calibrate" on the right side of the window will launch Apple OSX's built-in Display Calibration Assistant.



The Windows XP Advanced Displays Preference with available profiles showing. The steps for selecting a monitor profile are noted in red from one to five, and can be accessed by choosing Start>Control Panels>Display.

After you calibrate your monitor, you can create and install a profile for it so that your images will look more accurate onscreen. To help you understand what a monitor profile does, think of it as being like a Photoshop adjustment layer or curve that is applied to and "fixes" the images you see on your screen. On machines running Windows XP, Windows Vista, or Macintosh OS X, you can choose from existing monitor profiles, or you can create your own.



Above, the ColorMunki from X-Rite, which is available in three versions.

6

Set up, calibrate, and profile your display

One of the most important steps for getting quality, accurate, and consistent output is to calibrate and profile your computer monitor. Though your monitor will never give you an exact match to a print on paper, calibrating and profiling can improve things considerably. There are numerous hardware and software options for Mac and Windows users, and, for best results, I recommend using a hardware device known as a colorimeter or spectrophotometer. I've had very good success with products from ColorVision (the Spyder3 colorimeter, <http://spyder.datacolor.com>) and X-Rite (the Eye-One Display 2 and i1PRO, www.xrite.com). The newest display calibrator from ColorVision is the Spyder3 Colorimeter, and X-Rite recently introduced a monitor, printer, and projector profiling device called the ColorMunki. Both companies' websites have information about hardware/software bundles, as well as resources for learning more about color management. Both X-Rite and ColorVision make their monitor-calibration hardware available with different software in a range of user levels and price points. Pantone also offers monitor calibration and profiling tools in the \$100 range (called the huey and hueyPro) that are worth investigating.

Many variables go into monitor profiling, and a quick tip is to try to create a lighting environment that is consistent without letting too much light fall directly on your monitor. Overhead light

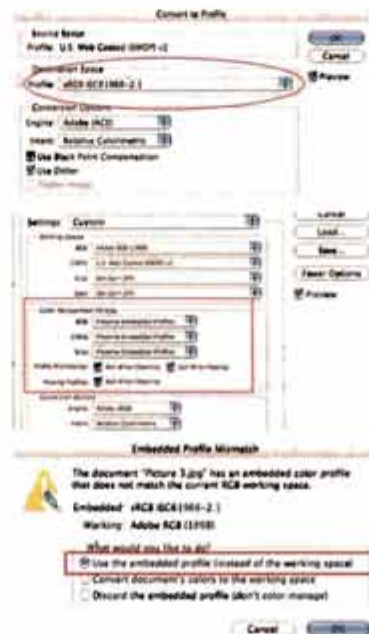
and light from directly behind your monitor can create unwanted glare and reduce the accuracy of the images you are viewing. Some companies, such as Eizo (www.eizo.com), make monitor hoods for some of their products to shield them from some of the light in a room. A collapsible monitor hood can also be constructed inexpensively using black matboard and tape, and, for situations when you want to significantly shade a laptop screen, some companies, such as Hoodman Corporation (www.hoodmanusa.com), make laptop shades to help eliminate glare.

7

Decide which working-space profiles to use

One of the most common questions asked is, "Which working-space profile should I choose when converting raw files, when scanning, or when setting up a digital camera?" Working-space profiles (or editing-space profiles) are generally embedded inside files, such as TIFFs, PSDs, and JPEGs. If you shoot in raw mode, the working-space profile setting (usually sRGB or Adobe RGB [1998]) that you can often choose in your digital camera, has no real meaning until you export your file and choose a working-space profile using raw-processing software. When you scan film or a print, you will also have different working-space profiles from which to choose. To capture a very wide range of colors, I recommend choosing ProPhoto RGB or Adobe RGB [1998].

Some of the most common working space profiles are sRGB, Adobe RGB [1998], ColorMatch RGB, and ProPhoto RGB. ProPhoto RGB is a color space with an extremely wide gamut, which means that it can hold a very wide range of color. This is primarily important



Top: Photoshop's Edit > Convert to Profile screen with sRGB chosen as the destination working space profile (circled in red). Center: Photoshop's Edit > Color Settings area with the Color Management Policies outlined in Red. Bottom: Photoshop's warning dialog box came up because the embedded profile (sRGB) did not match the Working Space Profile (Adobe RGB [1998]). "Use the embedded profile," selected in red, is the correct option to choose in this case.

■ file-prep and color-management

because, as better monitors and more advanced printers are introduced, you are able to display and print more saturated colors. If you convert a raw file from a digital camera and embed a very wide working-space profile like ProPhoto RGB, then you will have an insurance policy as new technologies are introduced.

However, if you export raw files using a working space with a smaller gamut, such as sRGB, you cannot regain the additional colors that were lost by not starting with a wider working space.

Over the last few years, I've primarily used Adobe RGB (1998), which has a smaller gamut than ProPhoto RGB, but I'm now converting many of my raw digital camera files into the ProPhoto RGB working space when exporting them as 16-bit PSD or TIFF files, and I've been satisfied with the results.

When using wide-gamut working-space profiles, it's critical to keep the profiles embedded in your files when moving files from computer to computer, and it's also important to know how to properly open and save files that contain embedded profiles. In virtually all cases, you want to "Use the embedded profile" when presented with a dialog box that asks the question, and always set your imaging program to warn you when opening files with a different embedded profile. In Photoshop, these can be set under Edit > Color Settings.

For those who choose to shoot photographs with your digital camera in JPEG mode, I generally recommend that intermediate to advanced users choose Adobe RGB (1998) from their camera's menu settings. However, many people (including many pros) choose to use the sRGB working space for all their digital photos; sometimes that is the only option. For many situations—including making inkjet prints, online image uploading, gallery viewing, and photo ordering through an online photo-sharing site like Flickr.com—sRGB can do a very acceptable job.

8 Optimize your color to black-and-white conversions and toning

Converting from color to black-and-white is as much an art as a skill. The most important thing to remember is that there is no best method for everyone. The best approach is the one that is within your budget, gives you results that you like, and the one which you can use effectively. You may even decide to use multiple tools, depending upon the type of images that you are converting.



Adobe Photoshop Lightroom's Develop Module, left, showing the Grayscale Mix option (circled in red) and the Target Adjustment - Grayscale Mix button (circled in blue). At right: Lightroom's "Basic" section of the Develop Module, with the "Recovery" and "Fill Light" adjustments circled in green. The original color image prior to conversion is also shown. Notice how the green background was made almost black by adjusting that color range in the Grayscale Mix area of Lightroom.

The value of shooting in RGB color or scanning color film—as opposed to setting your camera to grayscale, or scanning in grayscale—is that the three channels in an RGB file offer a tremendous amount of flexibility. Black-and-white film photographers have often used filters in front of their lenses, such as a red filter to darken skies. When you shoot in color, you can get similar results, but with far greater control, because instead of just one "film channel," you are capturing three separate channels of information, which can then be optimized to produce black-and-white images and prints.

There are a few standout tools that I like to use for converting to black-and-white and for simulating certain black-and-white films. Adobe Photoshop Lightroom's Grayscale Mix option is the first. Apart from having many other functions, within Lightroom's Develop module (under Grayscale Mix—circled in red, above left), Lightroom allows you to choose specific areas of an RGB file and then mix the RGB channels intuitively by first clicking on the Target Adjustment - Grayscale Mix button (circled in blue). Scrolling with your mouse wheel, or pressing the up and down arrows on your keyboard will mix the channels depending upon what color range you are targeting. It is especially powerful when used together with the "Recovery" and "Fill Light" adjustments available under the "Basic" section of the Develop module. The Recovery adjustment helps to bring detail back to the highlight areas, and the Fill Light adjustment helps to open up shadows while preserving overall contrast and detail. Settings can also be saved and applied to other images, or shared with others.

Adobe Photoshop CS3's Black and White adjustment (Image>Adjustments>Black and White) has a very similar interface, but works inside of Photoshop CS3. If you use it, I highly recommend first creating an Adjustment Layer. This will offer more control, and, more importantly, the adjustments you make can then be saved and applied to other images. An Adjustment Layer can be created by clicking the black-and-white circle at the bottom of the Layers palette, followed by selecting Black and White from the list of choices. Photoshop CS3's Black and White adjustment also allows for tinting to be done on images. Tinting is similar to toning in the darkroom, but this tool offers far more control over the range of color that can be produced.

Alien Skin Software's Exposure plug-in is also well worth checking out. It has an interface with presets that emulate many different film stocks, and in some cases, can produce what I like to call "clumpy grain." Certain classic black-and-white films, such as Kodak T-Max 3200, have a unique grain structure that makes the grain appear to be clumped together. It is very easy to configure and save settings, and the preview window is fantastic. In general, if you plan to use any filter or plug-in, I recommend first optimizing your black-and-white files using a tool such as the two Adobe products mentioned previously.

And for those who want a very well thought-out Photoshop tutorial on this subject and others, I recommend investigating Vincent Versace's black-and-white techniques, which are available in his book, *Welcome To Oz*. **BC**



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