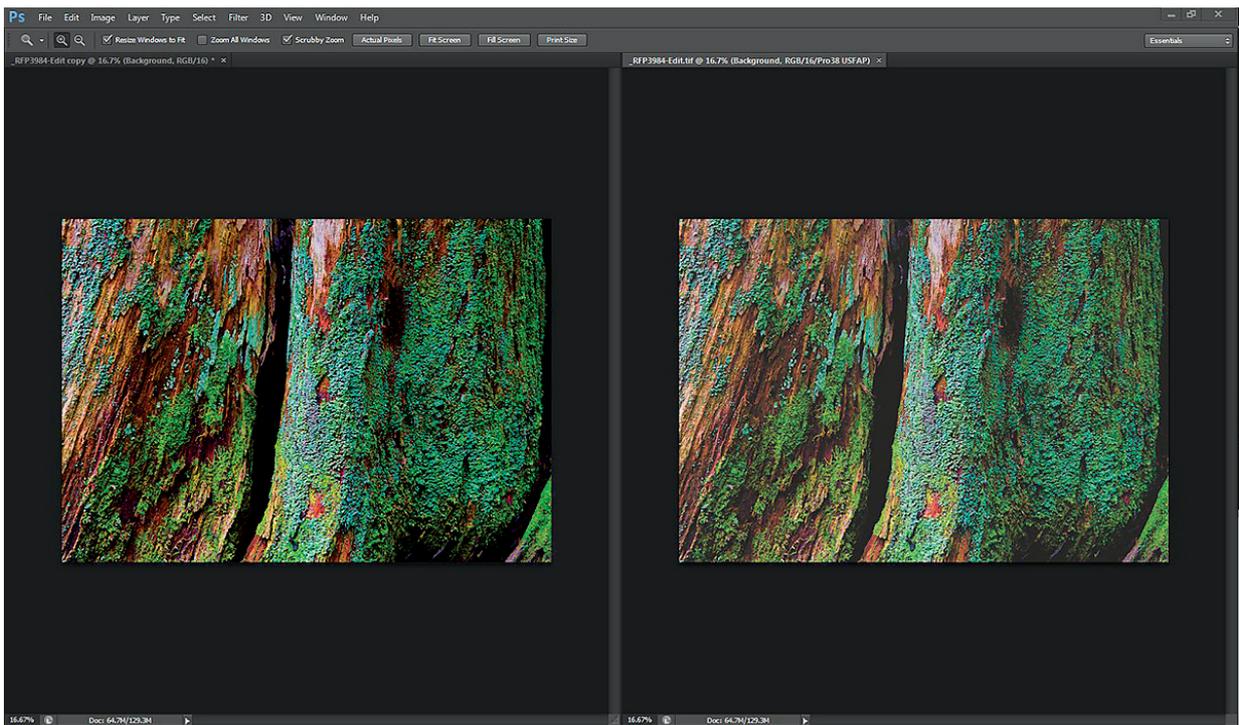




the **Rendering Intent** to **Relative Colorimetric**. I've checked the box to turn **Black Point Compensation** (BPC). (The sidebar on page 129 explains BPC as well as each of the four Rendering Intent settings.)

Under Display Options (On-Screen), is a check box for Simulate Paper Color. This adjusts the image to show you a preview of what the image will look like on a given paper. It will apply any hue or warm or cool tone the paper has, and will more accurately show the dynamic range of the printed image. When you soft proof, turn this option on by checking the box as I have done. After you've made all your selections, click **OK** to close the dialog box. You'll see that your image will change to something that looks pretty ugly. That's alright. We're going to fix it.

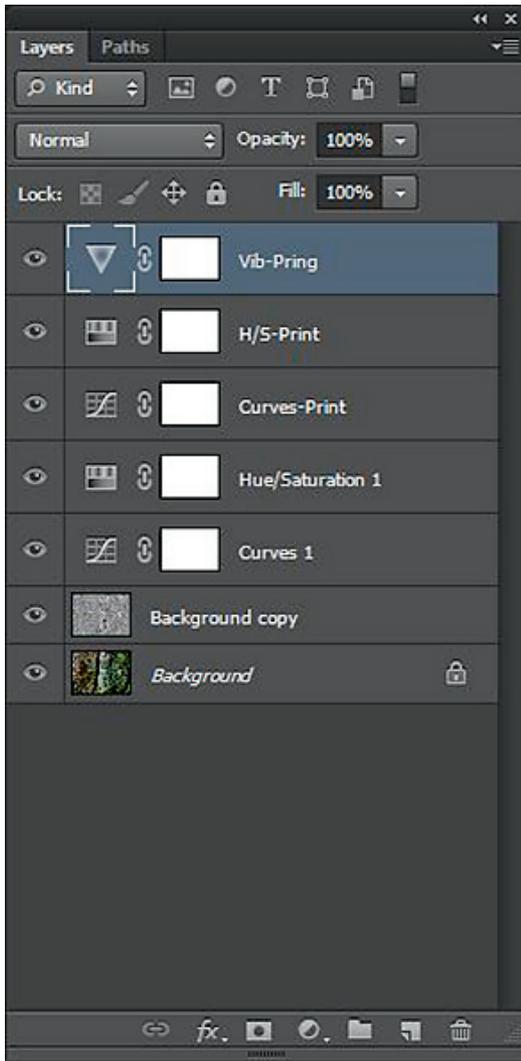


▲ *Figure 8.5: Soft proofed original (right), and unproofed copy (left)*

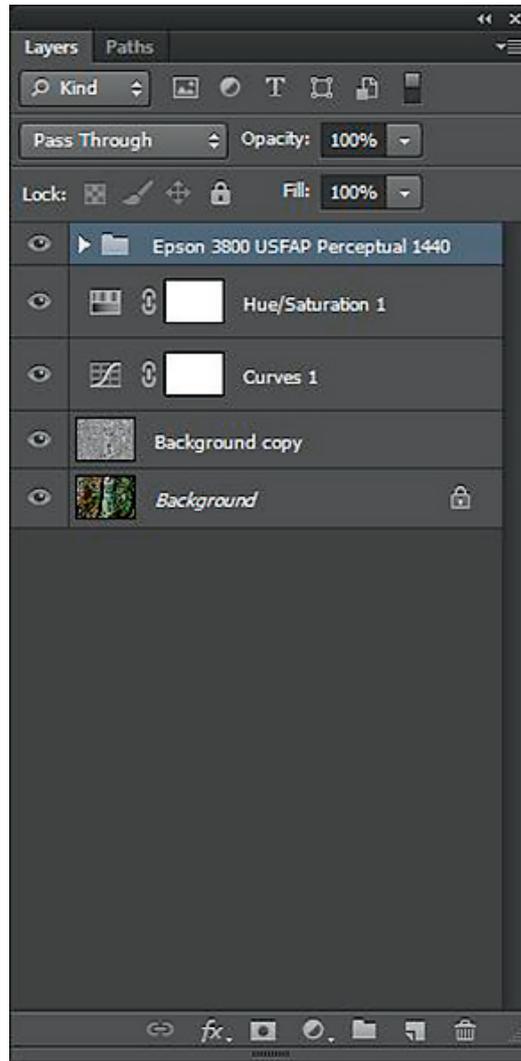
The visual match will typically be closer with hard papers than with soft papers. The paper in this case, UltraSmooth Fine Art, is what I call a soft paper. It isn't going to reproduce blacks as deep or whites as bright as a hard paper would. If I had chosen a hard paper such as Epson's Ultra Premium Glossy, the difference between the two versions would be smaller.

The goal now is to make adjustments to the proofed original to make it look as close as possible to the unproofed copy. You're rarely going to get the two to look identical. You should still make adjustments at this stage as layers, so that you can delete or alter them in the future as needed. I added **Curves** and **Hue/Saturation** adjustment layers to the proofed version. The final proofed version with adjustments is shown in figure 8.6.





▲ Figure 8.7: Printing adjustment layers at the top of the stack



▲ Figure 8.8: Printing adjustment layers grouped and named for the paper, printer, resolution, and rendering intent

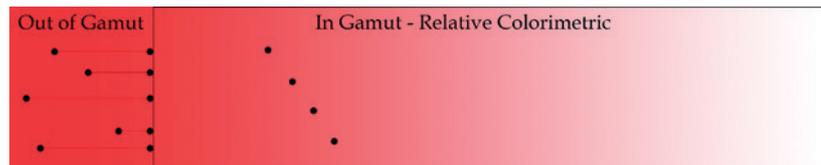
**i** **Rendering Intents**

There are four different rendering intents. The rendering intent determines how out-of-gamut colors are reproduced. What are out-of-gamut colors? They're colors that are out of the range that can be reproduced by the paper and ink in a print. The color gamut of the paper and inkset is the universe of colors that they can reproduce. Rendering intent only matters for practical purposes when printing. When we switch from one editing color space to another (e.g., Adobe RGB to sRGB), the rendering intent is relative colorimetric by default. This will change as what are called Version 4 ICC profiles become more widely used, but with the use of Version 2 profiles, the intent is relative colorimetric.

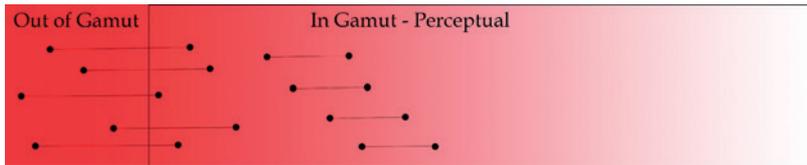
ICC stands for International Color Consortium. This international body develops the specifications for producing color profiles and makes recommendations for how color profiles should be used in color-managed workflows. These broader color spaces, called *working color spaces*, are referred to as device independent. That is, they are the same regardless of where the image is being viewed. The color space of a printing paper or a monitor, which is called an *output color space*, is referred to as device dependent. That is, the color space is entirely dependent on the ink/paper combination or the specific monitor.

**Relative colorimetric:** All of the out-of-gamut colors are remapped to the closest in-gamut colors. If we have a particular red that is 150, 25, 25, and another that is 175, 20, 20, and both are out of gamut for the particular ink/paper combination and the closest in-gamut color is 125, 55,55, then both of these out-of-gamut reds will get reproduced as the same in-gamut red. What this can cause with a lot of out-of-gamut colors is an increase in saturation of some colors at the outer limits of the gamut. What also happens with relative colorimetric is that the white point of your source image gets remapped to the white point of the destination paper. In other words, white stays white, as much as possible. If your paper has a warm tone, the white of your image will become the warm tone of the paper in your print.

► *Figure 8.9: Out-of-gamut color mapping with the relative colorimetric rendering intent. In-gamut colors don't change, and out-of-gamut colors get remapped to the limit.*



**Perceptual:** The perceptual rendering intent remaps *all* of the colors in an image, both in-gamut and out-of-gamut, so that the relationships between the colors remain as close as possible. This can sometimes cause a small decrease in overall color saturation, but because the relationships between colors are maintained, the *perception* of color and saturation stays pretty much the same. Perceptual is a good starting point for soft proofing and printing. If you try perceptual and don't like how it looks, switch to relative colorimetric and see if it works better.



◀ *Figure 8.10: Color mapping with the perceptual rendering intent. All colors get remapped relative to each other. The result is a compression of the entire color range of the image.*

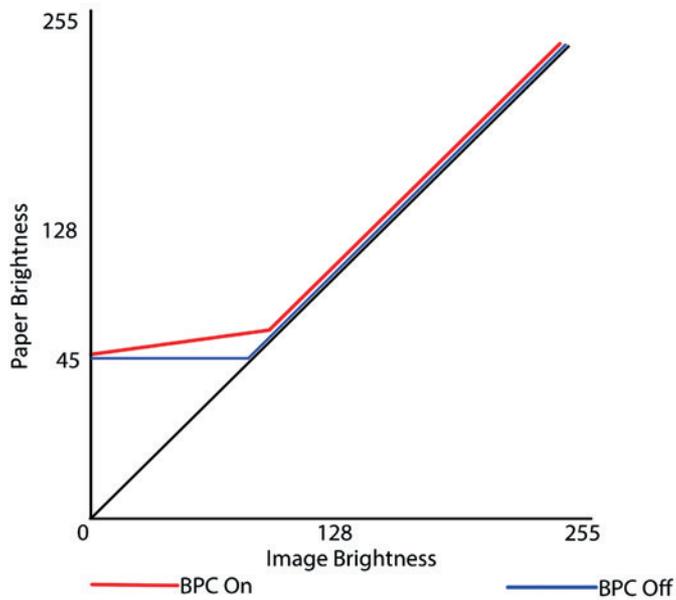
**Absolute colorimetric:** This rendering intent remaps out-of-gamut colors in the same way as relative colorimetric. What it doesn't do is remap the white point. Absolute colorimetric will overlay the color of the paper you're proofing with onto the paper you're printing on. You're already doing that visually by selecting Simulate Paper Color in the proofing dialog. If you print with absolute colorimetric to a warm-toned paper, for example, the warm tone of the paper will be printed onto the warm-toned paper, doubling the effect. Absolute colorimetric is good to use if you're simulating another device, such as a printing press, and you know you're going to be printing onto a paper that has a different base from what you're creating your proof on. This is a very specialized case and not one we want to use for photo printing.

**Saturation:** The saturation rendering intent remaps all of the out-of-gamut colors to the closest in-gamut color. This sounds the same as relative colorimetric, right? What the saturation intent also does is remap some *in-gamut* colors closer to the limit. This can cause a marked increase in overall saturation. Saturation also doesn't necessarily remap colors into the same color family. It remaps according to saturation levels. If you have a red that can't be replicated but there's a yellow that has the same saturation level, your red may get remapped to yellow. Not good.

**Black point compensation:** Applying BPC will be an image-by-image choice. The choice will be determined by how well the paper you're using reproduces deep blacks and what the Dmax (the deepest black the paper can reproduce) of the paper is. BPC remaps the black point of the image to compensate for the ability of the paper to render deep blacks. With papers like the softer media, if BPC is left turned off, you may get a lot of blocked-up shadows. Turning BPC on will lighten some of those darker areas to retain as much shadow information as possible. Try it turned on and off to see which is better. The effects of having BPC on and off can be seen in figure 8.11. The diagonal gray line represents an image with brightness values ranging from 0 (black) to 255 (white). No paper can print that full range. In this case, I've shown a sample paper with a black point of 45. That means anything with a brightness value of 45 or lower will be rendered black on this paper. Referring back to the step wedge in chapter 1, we'll lose Zone I and some of Zone II. To compensate, turning BPC on remaps the black point of the image to 45 and slightly lightens some of the other dark values to retain shadow detail.

### Preserve Details Using BCP

BPC has another purpose in general color space conversions. If you're going from a color space with a deep black point to one with a less deep black point, you can get blocked-up shadows. You can also have the inverse. If you're going from a color space with a higher black point to one with a lower black point, you can get shadow areas that appear washed out. Using BPC in these cases will preserve your blacks and shadow detail. In the first case it will do the same as with a print and lighten the areas appropriately to retain shadow detail. In the second case BPC will actually darken those areas further to keep them from appearing overly light, being washed out and reducing the contrast in your image. Note also that when you're using the perceptual rendering intent, checking or unchecking the BPC box will make no difference. The reason for this is that with the perceptual intent, BPC is always turned on by default.



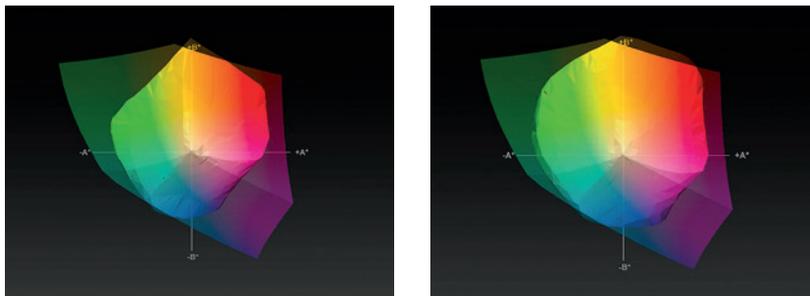
► Figure 8.11: Effects of having BPC on and off

### Why Use A Wide Color Space?

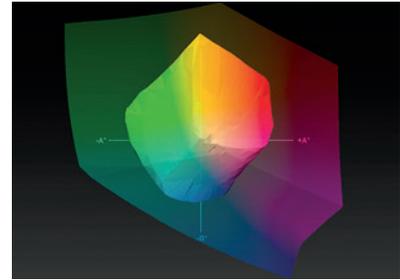
Recalling the color space gamut charts from chapter 2 and comparing the charts of paper color gamuts earlier in this chapter, you might be wondering why I've suggested working with a wide color space such as ProPhoto RGB when not all of the colors can be reproduced in a print. For reference, the next color gamut plot shows the difference between ProPhoto and Epson Exhibition Fiber, which is a paper with a very good color gamut.

There are a lot of colors in the ProPhoto space that aren't reproducible on this paper with the inks of the Epson 3800 printer. But look what happens when we compare the same paper on a newer printer with a newer inkset. The color gamut of the paper is larger with the Epson Stylus Pro 7900 printer and a newer inkset. How can this be? Technology changes. Technology improves. Just as digital cameras have become better over the years, so have printers and inks. Newer inks allow for greater levels of color even on the same paper. The main reason I suggest using ProPhoto is for future proofing. Because technology is always changing and improving, I want to be ready to take advantage of the new technology when it's available. If I used Adobe RGB I would have to go back and rework all of my old images, which would require a lot of wasted time and energy. Work smarter, not harder. Think ahead and try to take advantage as much as possible of what may come in the future.

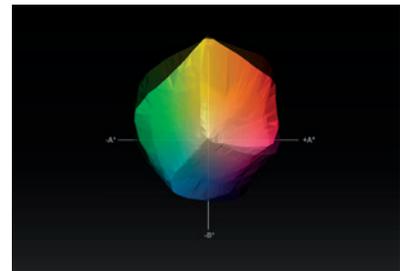
Here is another reason I suggest ProPhoto RGB: Adobe RGB is too small in some cases even now. The two plots in figure 8.14 show Adobe RGB compared to Epson Exhibition Fiber paper on the Epson 3800 printer and the same paper on the Epson 7900 printer. Even with the 3800, the paper/ink combination can reproduce more colors in some areas than the Adobe RGB space contains. The problem gets even worse on the 7900 printer.



▲ Figure 8.14: Color gamut plots of Adobe RGB (dark plot) and Epson Exhibition Fiber paper (bright plot). This identical color space and paper shown on an Epson 3800 printer (left) and an Epson 7900 printer (right).



▲ Figure 8.12: Color gamut comparison. ProPhoto RGB (darker/larger plot), and Epson Exhibition Fiber paper (brighter/smaller plot).

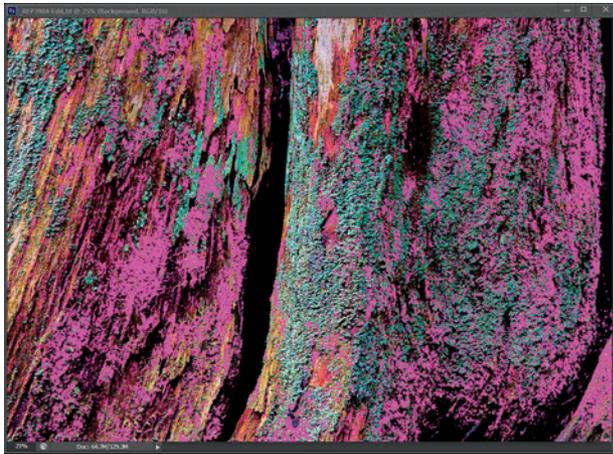


▲ Figure 8.13: Color gamut comparison. Exhibition Fiber paper with the Epson 7900 printer (darker plot) and the Epson 3800 printer (brighter plot).



### See Which Colors are Out-of-Gamut

Photoshop's **View>Gamut Warning** option (figure 8.15) will let you see which colors in your image are out of gamut for the paper you're soft proofing and the inkset being used.



◀ *Figure 8.15: Photoshop gamut warning*

This is an interesting utility that lets you see the specific areas of the image that aren't going to reproduce accurately in the print. You don't need to do anything to fix the out-of-gamut colors because the rendering intent will do it for you. The gamut warning just shows you which colors and parts of your image will be affected by the rendering intent.

Some photographers like to fully or partially fix the out-of-gamut colors themselves. They feel it gives them more control over the final result. Should you choose to make adjustments to bring more or all of the colors in-gamut, you can do this in your printing adjustments layer group. Create a new **Hue/Saturation** or **Vibrance** layer, label it appropriately (e.g., Color Gamut Adjustment), and then adjust the colors to reduce saturation, adjust brightness, or alter hue to bring the colors into the gamut of the paper. The default color for the warning overlay is gray, but gray can sometimes be difficult to see. You can change the overlay color to anything you like by going to **Edit>Preferences>Transparency & Gamut** (Photoshop>Preferences>Transparency & Gamut).

I chose a magenta color because it's easily visible and not likely to show up in an image. One thing the gamut warning does not do is show the intensity of the out-of-gamut colors. That is, the overlay is not denser in areas of greater out-of-gamut color. This would be a nice change on the part of Adobe and would make the utility even more useful.

When you're comparing your prints to what you see on-screen, it is important that you compare the print to your adjusted soft-proofed image and not the original image.