



BY SHAN CANFIELD

**T**his article should familiarize you with some basic truths about printing. Hopefully it will clear up some grave misconceptions about color mode and different types of resolution. If you've ever wondered what the specific purpose of a file format is and what you should choose then this tutorial is for you. If you haven't understood a word so far—then you definitely need to get your feet wet here with these straight up basics.

Launch Photoshop 6.0. Go under Edit > Color Settings. Press on the top Settings tab and choose "US Prepress Defaults." Click OK. Most of my files are embedded with the Adobe RGB (1998) profile, which is my favorite RGB color space to work in. The Color Sync profile on my Mac is set for a 2.2 gamma and 6500K. Windows users would use Adobe Gamma to set a 2.2 gamma at 6500K for the profile created during the calibration of the monitor.

### Correctly setting up files for printing to 99 % of consumer inkjet printers

MODE · IMAGE SIZE · PRINT SIZE · PPI RESOLUTION VS DPI RESOLUTION

The first thing to know—is to leave your files in RGB MODE for printing. Even though the inks are cyan, magenta, yellow, and black. They are not the same inks that are used in 4-Color Offset printing, nor is the technology the same. By converting the mode to CMYK, you are embedding a gamut or range of colors, dot gain, inks set-up, etc., that are intended for a file going to an Offset or Web PRESS, not an inkjet or most laser printers! For inkjet printing you are cutting your color gamut off at the pass by converting an RGB file to CMYK! Inkjet printers have a built in conversion algorithm that automatically processes the RGB colors for optimized printing. (Read your printer manual.) You get a broader range of printable colors on your inkjet by leaving the file in RGB mode. If you've converted to CMYK and closed the file, all your vivid RGB colors are lost. If you print the CMYK, the printer is still using the RGB algorithm and your print will more than likely look nothing like your screen! If you convert the CMYK file back to RGB, the mode will change but the original color information has already been tossed. So, it is not recommended to convert CMYK back to RGB with

hopes of regaining color gamut territory. It just won't happen! (See The Master Working File Format in File Formats section for more insights on CMYK.)

The next area to be aware of is the Image Size, Print Size (or Document Size in PS 6.0) and the Resolution of your file. For optimum printing results for my tutorials do the following: With the file opened, go under the Image menu to Image Size. UNCHECK the Resample box. Make sure Constrain Proportions is checked. If the Resolution is 72 pixels/inch change it to "150" pixels/inch. This will yield a 5" x 7.5" print (based on the nora.jpg in "From Black & White to Color tutorial). You will see the dimension for inches update automatically when you change the resolution. You have locked in the pixel dimensions (the file size in MB), by UNCHECKING Resample, this utilizes the inverse relationship between all the fields in the Print or Document Size area in this dialog box. Whether you change the inches or the resolution, all the remaining linked fields will change accordingly. For smaller print sizes—increase the resolution number; for larger print sizes—decrease the resolution number without going below 100 pixels/inch (PPI). The Image Size PPI resolution is NOT the same as your printer's DPI resolution. Using Photoshop's Image Size box in this way gives you tremendous leverage for your printing needs without hurting one little pixel. You still have the same number of total pixels in your file, all you're doing is changing the "key" by designating how many of those original pixels it will take to fill one inch. You can change this "key" as often as you like—it is NOT resampling that counts big-time in pixel pushing! So say it with me—"UNCHECK RESAMPLE before you do anything else to see what you've already got!"

There are two schools of thought or methods on setting the correct resolution for Photoshop's raster image files to be printed to inkjets & lasers. Both methods yield excellent results. The important thing to remember is that you don't have to make the documents PPI equal to the printer's DPI. You DO NOT want a raster document file with a resolution (PPI) of 720 or 1440. This would be a total waste of disk space and that would be way MORE information than the printer could handle or spool. If, by chance, the printer could process the file—the printed result would not be as good as a document processed with the correct and optimum resolution for the printing device. Remember—DPI IS NOT PPI, where raster files are concerned! Say it again, "DPI IS NOT PPI!" When you've reached a level of professionalism you may interchange these terms because you will KNOW they are different. I can't tell you how many authors, speakers and scanner manufacture companies erroneously throw the DPI term into the PPI realm. They are using a simplified somewhat universal term to describe resolution. All tissue is NOT kleenex! Problems arise from this careless use of the term DPI when it gets in the hands of someone who is new to computers or print technology. People who are just learning try to think logically—so—they end up creating Photoshop files with huge resolutions (pixels/inch) to match the same amount of their printer's resolution (dots per inch). They also equate the term when scanning. Even though the scanner software may say DPI—it is actually SPI, which stands for samples per inch. DON'T choose the scanner resolution to match the DPI of the printer, either! Pixels are NOT DOTS they are square and have no inherent size until you set up the size by directing how many pixels you want to equal one inch. Samples are NOT DOTS, they are optic photon sensors that sample the reflected information according to how many sensors you want turned on per inch (maxing out at the scanner's Optical Resolution figure\*—anything above this number is using the scanner software to interpolate which is making up information for the additional pixels) for the sampling. Scanning translates your file into pixels/inch—not dots per inch. Have you ever scanned an image and opened it in Photoshop to find that the Image Size box says 300 dots/inch (DPI) in the Resolution field? NO...it is pixels/inch (PPI). So, don't despair if you're files have been so large they crash your computer or take forever to print. It's not your fault! The industry has made it difficult by swapping a resolution term from printing devices for file and scanner resolution.

**Method #1:** No matter what DPI resolution you're using on the printer—the PPI resolution of your file should be between 100–300 pixels/inch. No more & no less. I tend to use this method 99% of the time with excellent results and a savings on file size. My files are usually between 130 PPI–300 PPI for inkjet printing, which I print at the printer's 720 DPI setting.

**Method #2:** Use the DPI resolution setting that you're choosing for your printer's output to calculate optimum PPI resolution for the file, by dividing the printer's DPI by the number by 3. For example, if you are printing at 720 DPI; the document's resolution should be 240 PPI. If you are printing at 300 DPI, the resolution could be 100 PPI. I have not observed any quality improvement by printing a 240 PPI file over a 150 PPI file, both printed at 720 PPI. The 150 PPI file's quality was the same as the 240 PPI but there was substantial savings in Megabytes with the 150 PPI file.

Get beautiful prints without interpolating (Resampling) your files by using these methods. The most important things to remember are to UNCHECK Resample in the Image Size dialog box for different Print output sizes, keep your file in RGB mode, and remember that pixels per inch (PPI) do NOT have to match an inkjet printer's dots per inch (DPI). When scanning an image that you will print to an inkjet printer, scan using a number that is an even multiple of the Scanner's \*Optical Resolution. This is the lower number of the Scanner Specs. For example a 600x2700 DPI (wrong term) Scanner has an "optical" resolution of 600. So scan using 150 or 300 in the scanner resolution field. Both 150 and 300 go into 600 evenly. This allows for an even distribution of the optical "eyes" that are turned on for the sampling. Don't add unnecessary file resolution to your documents when they don't need it!

## Some of Photoshop's file formats & when to use them

### MASTER WORKING FILE

I am a firm believer in always having a master working file for any print or web project. What is a master working file? It is a file in RGB Mode saved in the PSD file format with layers. This is the "digital daddy" file. From it—all other repurposed files are cloned (copied from). By repurposed, I mean that the file needs to be changed, resampled, flattened and converted to a different mode or saved in a par-

ticular file format for a specific output device or program. It is the work-in-progress file that has all the elements of the final piece; the layers, adjustment layers, vector data, type layers, masks and blending modes. Keeping this layered file allows you to go back and easily change positions of the elements, change effects or just tweak something. Another extremely important reason to keep an RGB file is for repurposing to different CMYK outputs. As simple as it seems to just select CMYK under the Image> Mode command, what you might be missing is that the conversion is applying all the specific settings that have been previously dialed in, either by default or by another user, to the "Color Settings" dialog box. This converts your document colors to the parameters of specific inks, ink set up, dot gain and type of paper stock. Once you convert to CMYK you can't change those embedded settings in your file. The most important thing to do is call the Printer, first, to find out what the CMYK inks set up should be in your program before you convert. And then DUPLICATE the RGB file to apply this conversion. Often Printers have a profile they can email to you. You would load that profile into the Color Settings and THEN convert the Duplicate file to CMYK. Photoshop allows you to name, save, create, and load your custom settings so you probably will have several different ones if you use a variety of professional Printing companies. Always save your RGB file in PSD format as the MASTER WORKING FILE that you use to make copies from.

#### FOR WEB & PRINT

### PSD(PhotoShop Document)

The Master Working File. The native format of Photoshop will allow you to preserve layers, alpha channels, paths, vector information and annotations. It compresses to a much lesser degree than JPEG, but it is a lossless compression which means you are not losing any information. It gives you a lower file size than a TIFF or an EPS on a flattened file. Use this file format for the Master Working file or for files that need to be edited within Photoshop. Other programs usually require a different format for importing., so you would duplicate your master, changing the format and mode on the duplicate, to what is necessary for the other programs or output device. This PSD file format supports all available modes, type, and layer effects.

#### FOR WEB & PRINT

### JPEG (Joint Photographic Expert Group)

A great file format for archiving photos, files for the web, and email, It is a "lossy" file format. By that, I mean that the compression used removes some information from the file to lower the file size (MB or KB). How much is removed depends on the quality setting you choose, when saving. The higher the quality—the lesser the amount of compression and the greater the file size. The lower quality setting yields a smaller file size due to the greater amount of compression and loss of information. Using this file format on images that will only be viewed is fine. The problem arises when you use the same JPEG file over & over again as a "working file." Every time you re-save a JPEG as a JPEG, more compression is applied over the previous compression, removing more and more information for each successive SAVE. That pixel information is "lost." That is why I suggest duplicating the JPEG and saving it with the PSD format. Normally if the JPEG was saved with a high enough quality setting, this one shot save over to a PSD will be fine. If you are duplicating a file from your master PSD working file as a JPEG, the best way to do it is to go under Image> Duplicate. Then go to the "Save for Web" command found under the File menu in Photoshop. This gives you a window with tabs that you can click in order to see the results of various compression settings before you decide on one. Clicking on the "4 UP" tab allows you to view your original along with three other image views, which you highlight one at a time to dial in various settings. The image view boxes give you the file size info, the download time on various modems and a visual means to weigh the various compressions against the quality of the image. It's the best way to view and save a JPEG, PNG or GIF. A JPEG & PNG support 24-bit color, which is millions of colors and ideal for continuous tone images. JPEG supports RGB, CMYK, and Grayscale modes. It does not support alpha channels. Many photo labs are now using digital processors and JPEG's in RGB mode is the required format for processing your digital files into photos. Go to <http://www.Shutterfly.com> to see how easy it is to process your files!

#### FOR WEB

### GIF (Graphics Interchange Format)

This is a lossless LZW compressed file format for multimedia or web images. This format supports up to a maximum of 256 colors. It supports transparency in the

Indexed-color mode and is ideal for images with large areas of solid color. This is the format for saving animations—the animated gif is created by jumping to the Image Ready program. There you can create frames from your layers and manipulate effects and movement between frames by tweening. The GIF format is used to display graphics in HTML (hypertext markup language) documents all over the World Wide Web.

#### FOR WEB

### **PNG (Portable Network Graphics)**

This is a lossless file format that supports 24-bit images (millions of colors) and transparency. It supports images in RGB & Grayscale with a single alpha channel to determine the transparency. The PNG format also supports Bitmap and Indexed-color modes without alpha channels. This format may not be recognized by older browsers but is awesome for continuous tone, graphics and text..

#### FOR PRINT

### **TIFF (Tag Image File Format)**

is a larger file size than a PSD unless you check the LZW compression option. The LZW (Lempel-Ziv-Welch) compression is "lossless"—meaning that the file size is reduced but no pixel information is lost. You can now save layers in a TIFF file format but until recently PSD was the only format that would support layers, TIFF also supports channels, clipping paths and annotations. The flattened TIFF format is my choice format for sending files to a professional printer or for importing files into a desktop publishing program. It supports RGB, CMYK, and Grayscale files with alpha channels. It supports Lab, Indexed-color, and Bitmap mode without alpha channels.

#### FOR PRINT

### **EPS (Encapsulated Post Script)**

format takes up the greatest amount of disk space for flattened raster files. This is another file format that transfers into desktop publishing programs. I only use this format on flattened files greater than 50MB in size. I also use this format for raster files that include vector type or vector shapes that are being printed to a post-script printer. Most inkjet printers do not understand EPS files so it is NOT a good choice if your output is an inkjet printer. Your images will print poorly and pixelated because

the printer will not be able to read the post script information; it will print the low-res "screen placeholder," instead. A variation of the EPS format is the DCS 2.0 (Desktop Color Separation) and this format should be used for saving CMYK files that have additional SPOT color channels or Multichannel Grayscales with SPOT color channels. EPS supports RGB, CMYK, Lab, Indexed-color, Duotone, Grayscale and Bitmap modes. It also supports Clipping paths but does not support alpha channels.

#### FOR WEB & PRINT

### **Photoshop PDF (Portable Document Format)**

supports millions of colors, layers, alpha channels, annotations, and lets you save vector information. This is the best format to use if your rasters include vector data and you need to use the file in the print world and the web world. The Photoshop PDF can be opened in any program that supports PDF like the free Adobe Acrobat Reader program. It supports RGB, Indexed-color, CMYK, Grayscale, Duotone, Bitmap, and Lab color modes. ■

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