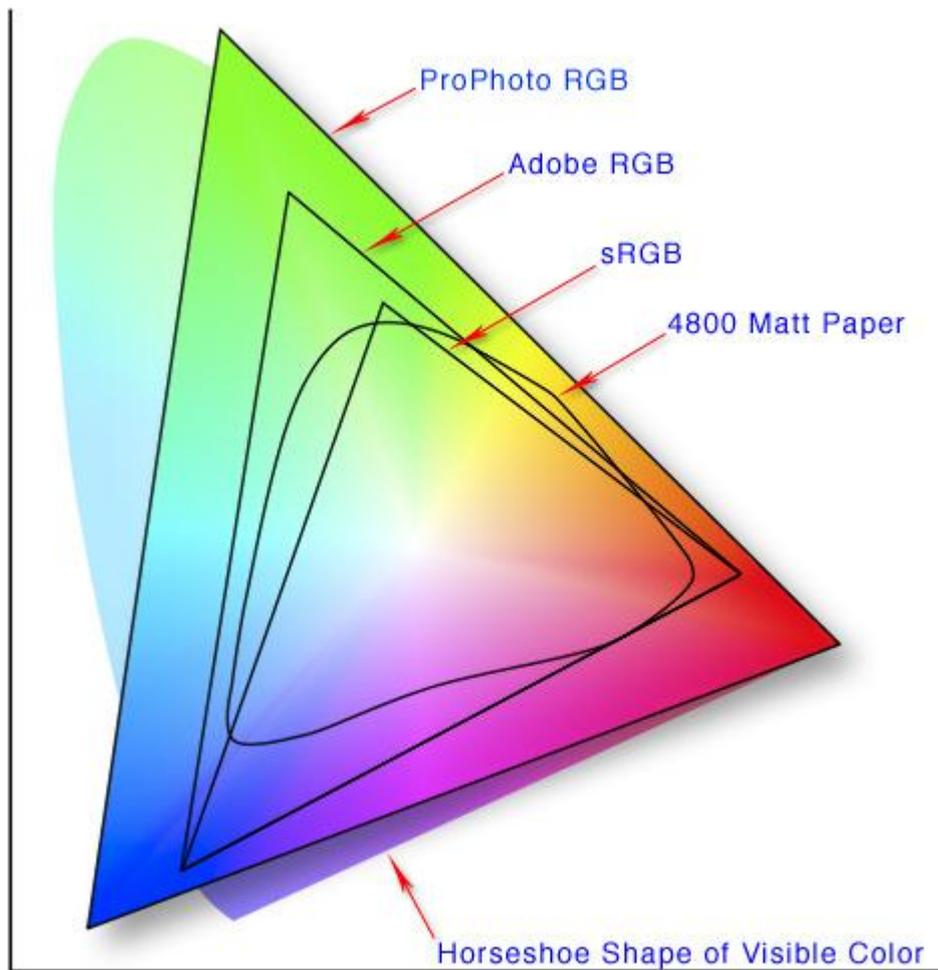


Adobe RGB (1998) vs. ProPhoto RGB

**Are you getting maximum quality in your images and prints?
The answer is probably not!
Why? Read on.**

This is an extract from an Adobe Technical paper:

At this point, we should put to bed the myth that digital cameras capture sRGB. The truth is that cameras are not limited to capturing a gamut as small as sRGB. Very often, camera sensors capture saturated colors that fall outside the gamut of even Adobe RGB. For some images, if the goal is to maintain the maximum gamut, the only color space that can do so is ProPhoto RGB.



This gamut map of the various color spaces shows that there are colors that can be printed on an Epson 4800 that fall outside both sRGB and even Adobe RGB. ProPhoto RGB can contain all colours that a digital camera can capture—even highly saturated colors. Cameras don't capture and printers don't print in sRGB color space. **End of extract.**

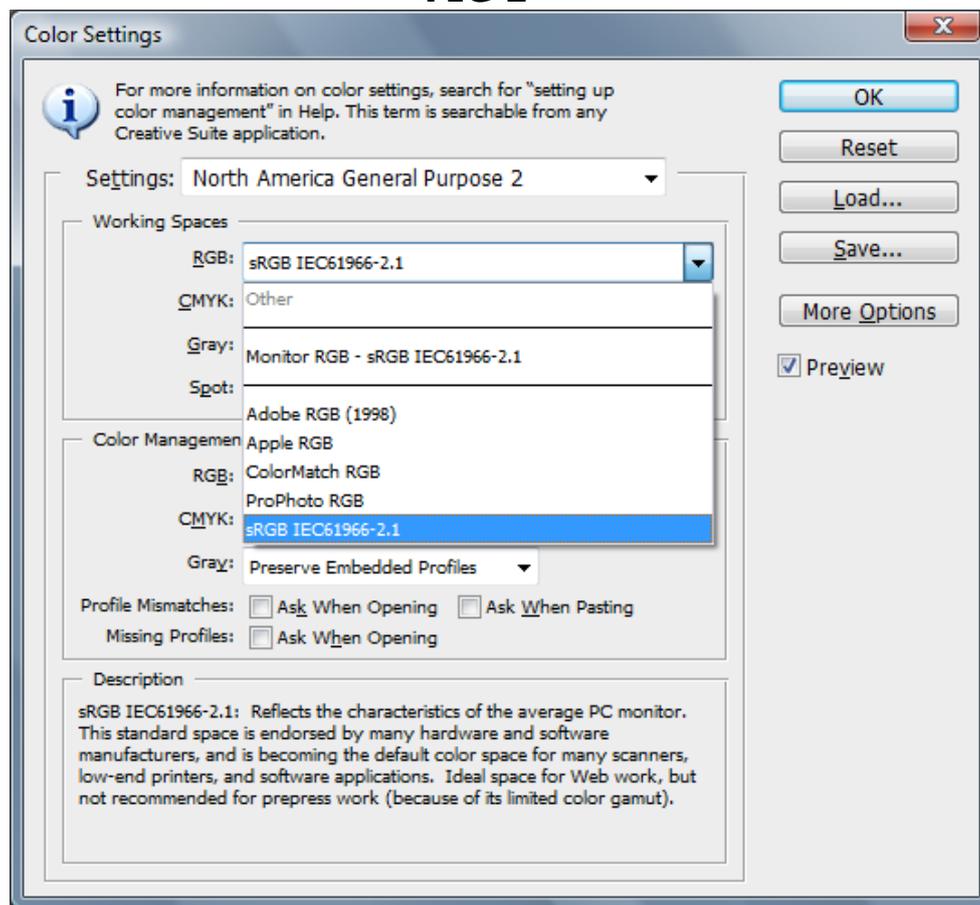
Many people are familiar with a lot of controls in Adobe Photoshop and for many years the main advice has been to process your **RAW** images using the Adobe RGB (1998) colour space in Adobe Camera Raw, then set the RGB working space in Adobe Photoshop to Adobe RGB (1998).

To set the RGB working space in Adobe Photoshop.

Selecting **Edit > Color Settings** menu in Photoshop.

(Shortcut = **Alt + Shift + Cntrl + K**) shows the pop up control box as shown below in

FIG 1



Most of us would select the Adobe RGB (1998) Working Space to process our image files.

However, Adobe RGB (1998) color space cannot handle all colour data that a digital camera sensor can record.

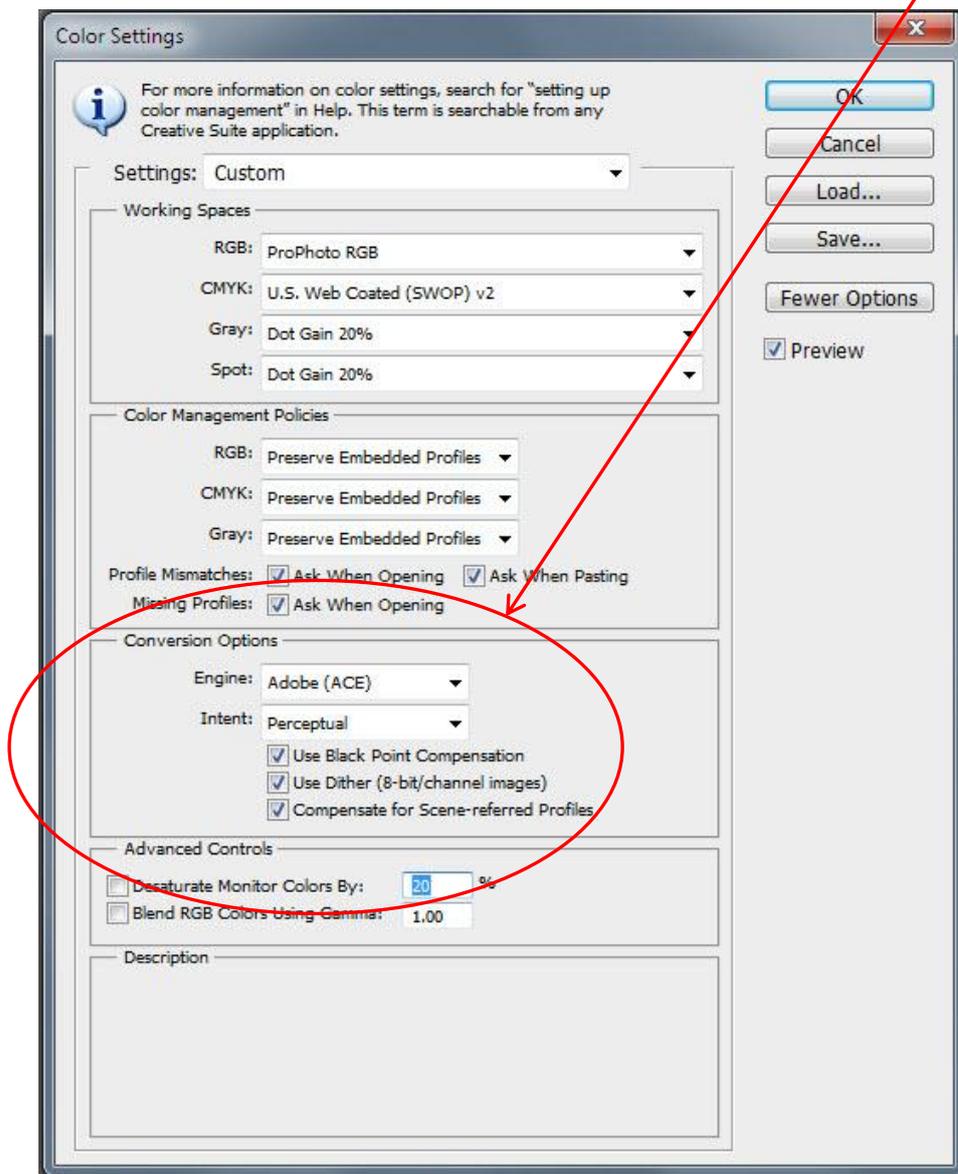
Therefore Adobe RGB (1998) does in a sense 'throw away' a percentage of the colour data.

Selecting **ProPhoto RGB** as your working space does **not** throw any of the colour data that your camera sensor records, providing you keep the image in 16 bit all the way through to the printer.

Please read on:-

Here are my personal Color Settings in Photoshop CS5
(click the More Options Button in FIG 1 to reveal the Conversion options)

FIG 2

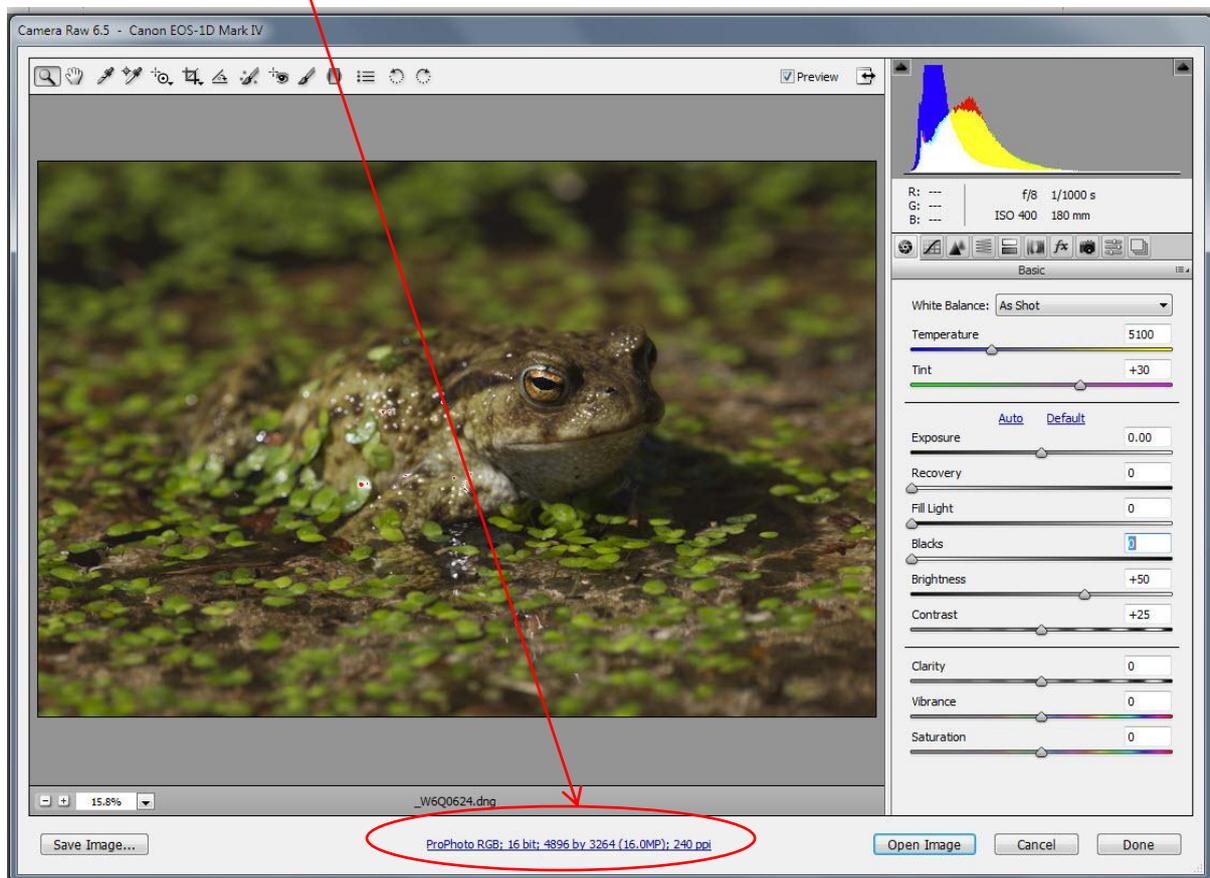


To set the Adobe Camera Raw to handle your Raw files in **ProPhoto RGB** Color Space:

Open up any raw file in Adobe Camera Raw as below.

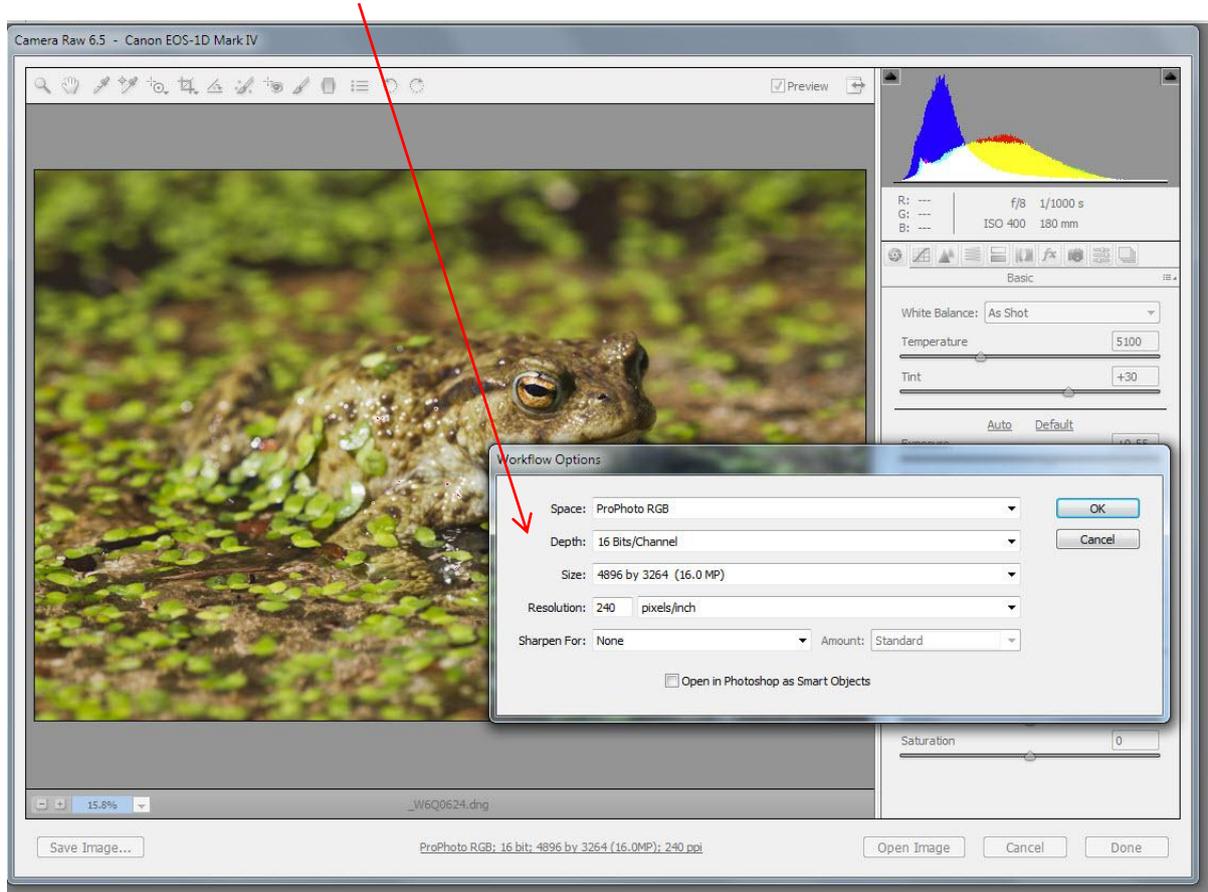
Notice the settings:

ProPhoto RGB; 16 bit; 4896 by 3264 (16.0MP); ppi



Click on the settings line and a box will pop up where you can change these settings. (As shown below)

Set the **Space** to ProPhoto RGB
Set the **Depth** to 16 Bit/Channel
Click **OK**



ProPhoto RGB or Adobe (1998)?

Should I use **ProPhoto RGB** or **Adobe RGB (1998)** color space for my images?

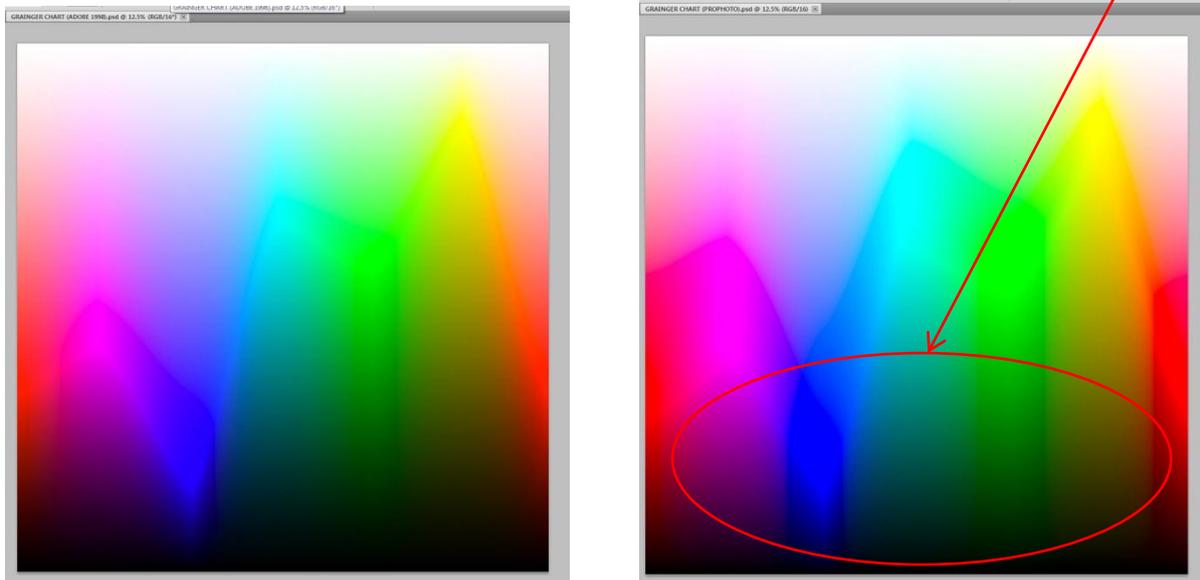
I have prepared a [Granger's Test chart](#) in Adobe RGB (1998) color space and a second one in ProPhoto RGB. **Because this file is mathematically derived, it contains colours which no display device, from screens to printers, can completely display properly. That's what makes it such a powerful evaluation tool.**

My monitor is a NEC Spectraview monitor and I can view the full Adobe RGB (1998) colour space plus a little more.

On my monitor I see the full range of the colour in the Grangers test chart constructed with the Adobe RGB (1998) Color Space

On the Grangers test chart constructed with the ProPhoto RGB Color space, I see all the colours of the Adobe RGB (1998) Color space plus only some of the extra colours in the ProPhoto RGB Color space (due to my monitor limitations)

(Even on my monitor I can see a lot more extended colours in this area)



I can see a big difference between these two images on my monitor, so why do they both look similar here?

The answer is that I have reduced them both to sRGB, thus reducing the extra colours that Adobe (1998) and ProPhoto RGB hold. Depending on the quality of your monitor, you may still be able to see some differences.

Printing the 2 [Granger Test Charts](#) is the only way to test to see if you will benefit from using the ProPhoto RGB color space.

When you load the two test images, make sure that they retain the colour space that is embedded within them on creation.

Let us examine some facts.
ProPhoto RGB color space

PROs

1. The native color space of Adobe Camera Raw is ProPhoto RGB, therefore if you chose ProPhoto RGB color space for the output color space, there is no colour information loss when converting Raw images.
2. In Adobe Lightroom 4, in the External Editing Preferences, it states that, 16-bit ProPhoto RGB is the recommended choice for best preserving colour details from Lightroom.
3. The Prophoto RGB color space can hold all the colour information from your camera's sensor.
4. Prophoto RGB color space contains all the colours that your printer can print and more. This means that provided you use ProPhoto RGB color space, you can print all the colours that your printer is capable of printing.
5. During editing in Photoshop, information is lost. After editing in Prophoto RGB color space, your final image will contain more colour information than if it were edited in Adobe (1998) color space. This is due to Prophoto RGB color space beings larger than Adobe (1998) color space.
6. The better inkjet printers and inks are capable of reproducing saturated cyans, magentas and yellows that are outside of the Adobe RGB colour space, making ProPhoto RGB a much better choice.

CONS

1. All the colours of Prophoto RGB color space cannot be seen on your monitor.
2. Prophoto RGB color space **MUST** be used in 16 bit mode.
If an image in Prophoto RGB color space is reduced to 8 bit, a lot of information is thrown away (much more than if the image was in Adobe 1998 color space) so banding may occur.
3. Your printer cannot print all the colours of the Prophoto RGB color space. **(But it can print some, that cannot be printed using the Adobe (1998) color space).**
4. If you use Prophoto RGB color space and you have a cheap monitor and a good quality printer, the chances are that the printed output will not look like the screen output.
(You may see a larger range of colours on the print than you can see on your screen).
5. If you do not use a custom profile for your print papers you may not get the best out of using Prophoto RGB color space.

Adobe RGB (1998) color space

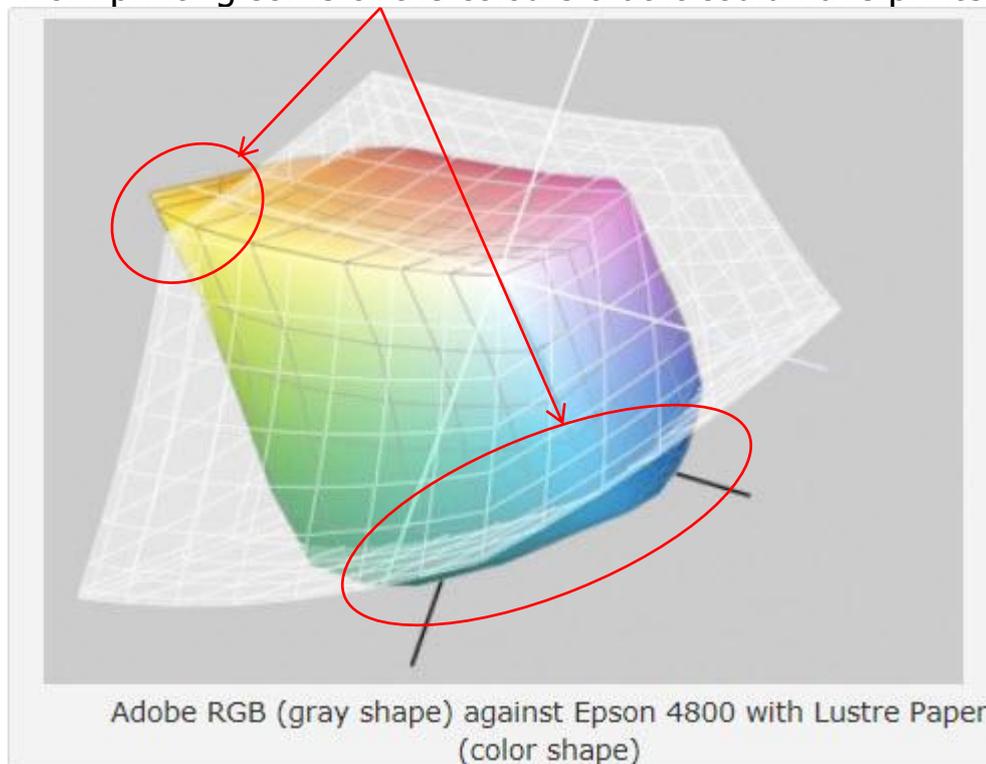
PROs

1. Adobe RGB (1998) color space is a well proven color space used by most discerning photographers.
2. Early inkjet printers and the cheaper modern printers only have a few ink colours (Cyan, Magenta, Yellow and Black) and Adobe RGB (1998) color space would let these printers print to their maximum quality which was within the boundaries of the Adobe RGB (1998) color space
3. If you have a good quality monitor the chances are that if you use Adobe RGB (1998) color space, you can display all the colours that the Adobe RGB (1998) color space can hold.

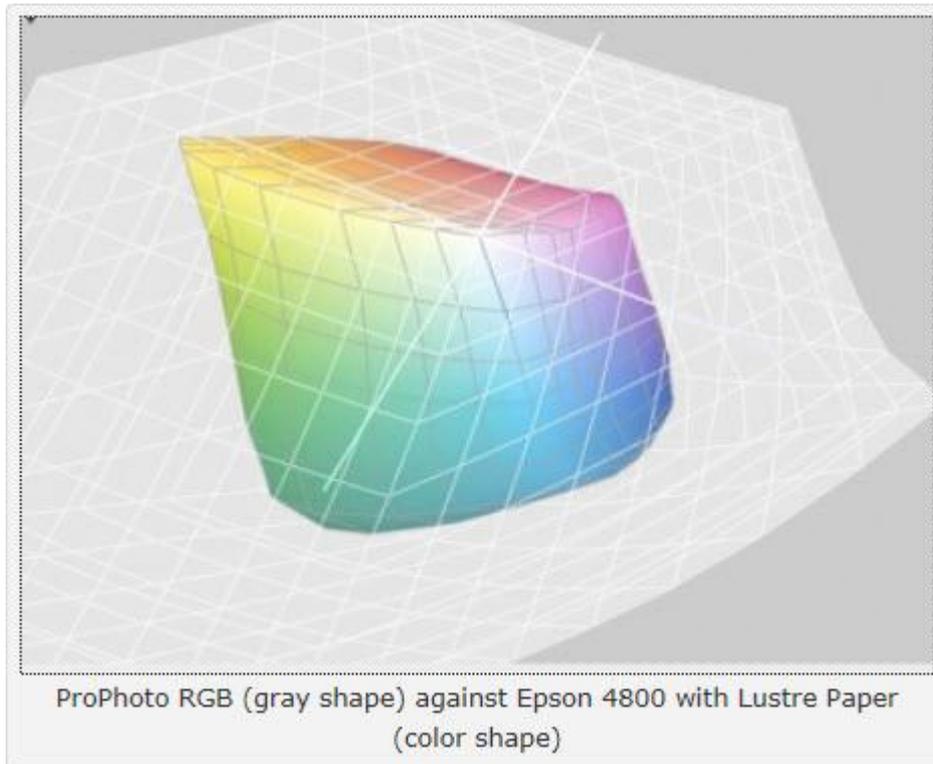
CONs

1. If you have a good quality printer, the chances are that it can print some colours that the Adobe RGB (1998) color space cannot hold, so these colours cannot be printed if the image is converted to Adobe RGB (1998) color space. If you process the Raw file in ProPhoto RGB color space and import it into Photoshop, then convert it to Adobe RGB (1998) color space, you are discarding colour information the instant you convert.
2. When a raw file is converted in Adobe Camera raw, you have the choice of outputting in different colour spaces. If you chose to output the raw conversion in Adobe 1998 color space, information is discarded and lost, because Adobe 1998 color space is smaller than the native ProPhoto RGB color space.

In this instance using an Epson 4800 printer and Epson Lustre Paper we can see that using the Adobe RGB (1998) color space will prevent the printer from printing some of the colours that it could have printed.



In this instance using an Epson 4800 printer and Epson Lustre Paper we can see that using the ProPhoto RGB color space will allow the printer to print all the colours that it is capable of printing.



You now have 3 options.

- (a) Stay with Adobe (1998) color space.
(A good general standard but no quality gain.)
- (b) Output images from Adobe Camera Raw into Photoshop using ProPhoto RGB color space in 16 bit mode, then edit them. After editing, convert to Adobe 1998 color space in 16 bit mode for printing.
(This method may reduce the editing losses, but it may stop a good quality printer from achieving its full potential.)
May not be as good as using ProPhoto RGB color space throughout.
- (c) Change to ProPhoto RGB color space in 16 bit mode.
(a possible gain in printed output quality)
You have to see a print quality gain by comparing the 2 versions of the Grangers Chart to prove this.

So do I change to ProPhoto RGB color space?

You really need to create the two [Granger Test Charts](#),
(see ProPhoto Test below) and then print both, to see if you can see a difference that is worth changing for.

Please [contact me](#) if you have any questions.

On creating this article I have used information from various articles on this subject and would like to give credit to the following.

[Silicon & Silver](#)

[Luminous Landscape](#)

[Adobe](#)

Derek Doar

ProPhoto Test

This article will show you how to create Granger charts in Adobe Photoshop.

Create two Grangers Charts, one chart using ProPhoto RGB Color Space then create a second chart using Adobe RGB (1998).

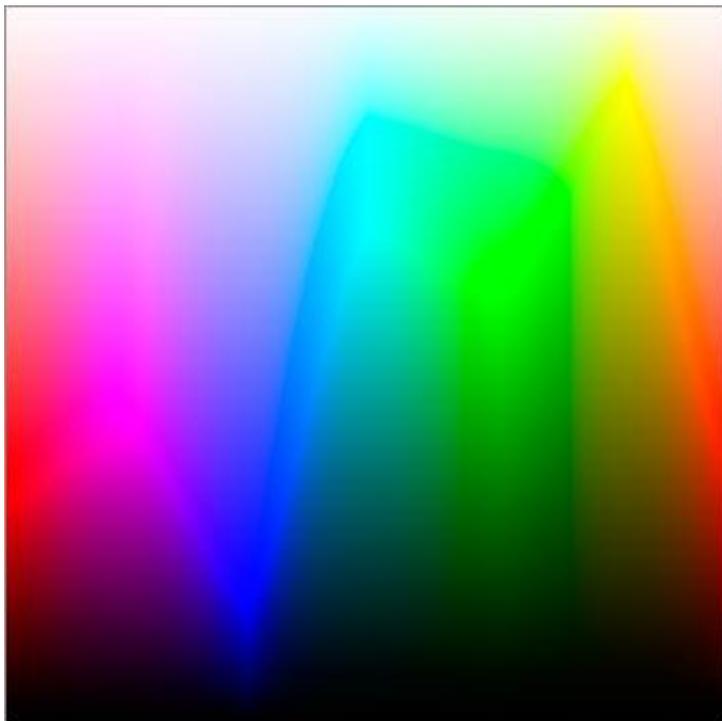
When you have created the two charts, print them on your chosen paper as you would normally do but do not change the color space of the charts.

Compare the two charts and if you can see the ProPhoto RGB chart print displays more tones of colours than the Adobe RGB (1998) chart, then it will be beneficial to change to ProPhoto RGB.

If you decide to change:

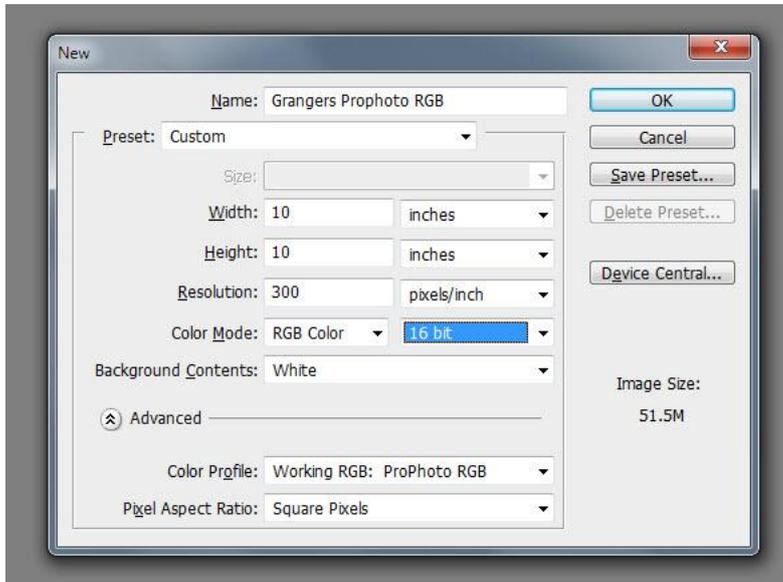
- (a) output from Adobe Camera Raw in ProPhoto RGB Color Space.
- (b) Change your default Color Space to in ProPhoto RGB Color Space in Photoshop. **(WARNING: you must stay in 16bit mode).**
- (c) Print your images with ProPhoto RGB Color Space.

Granger Chart

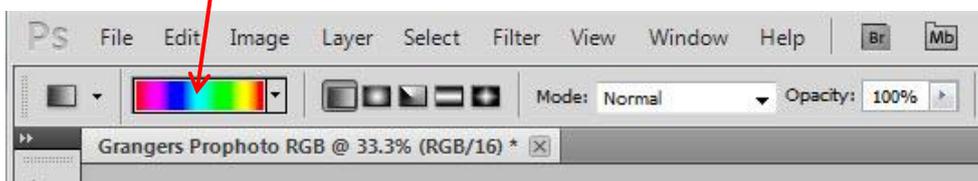
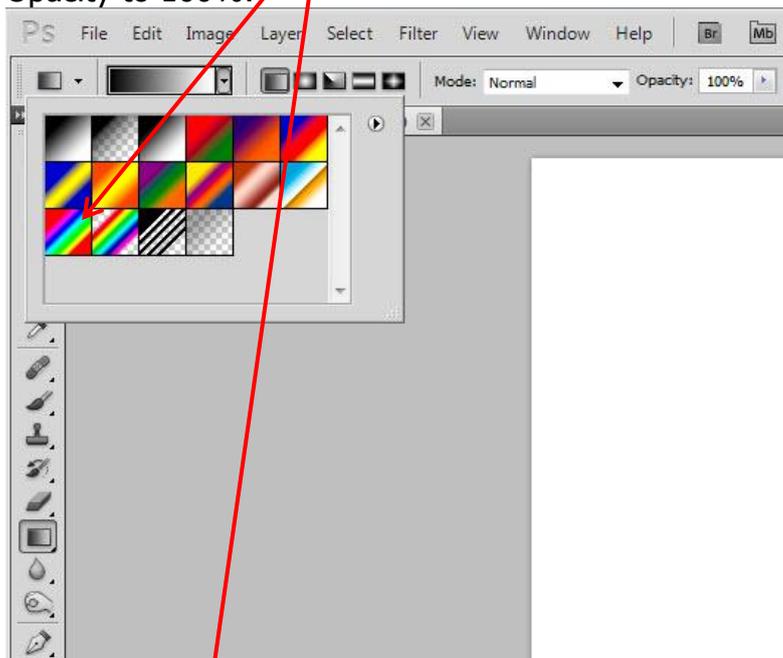


CREATING A GRANGERS CHART

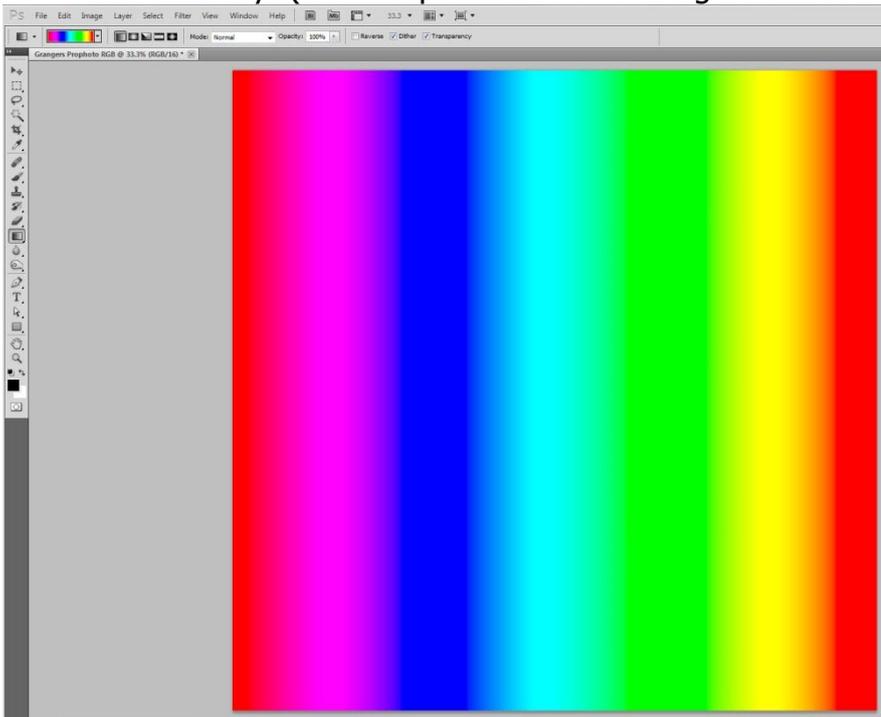
1. Create a new file. CTRL / CMD – N. I make mine 10 inches by 10 inches at 300 ppi in 16 bit RGB mode. Make sure that the Background colour is White.



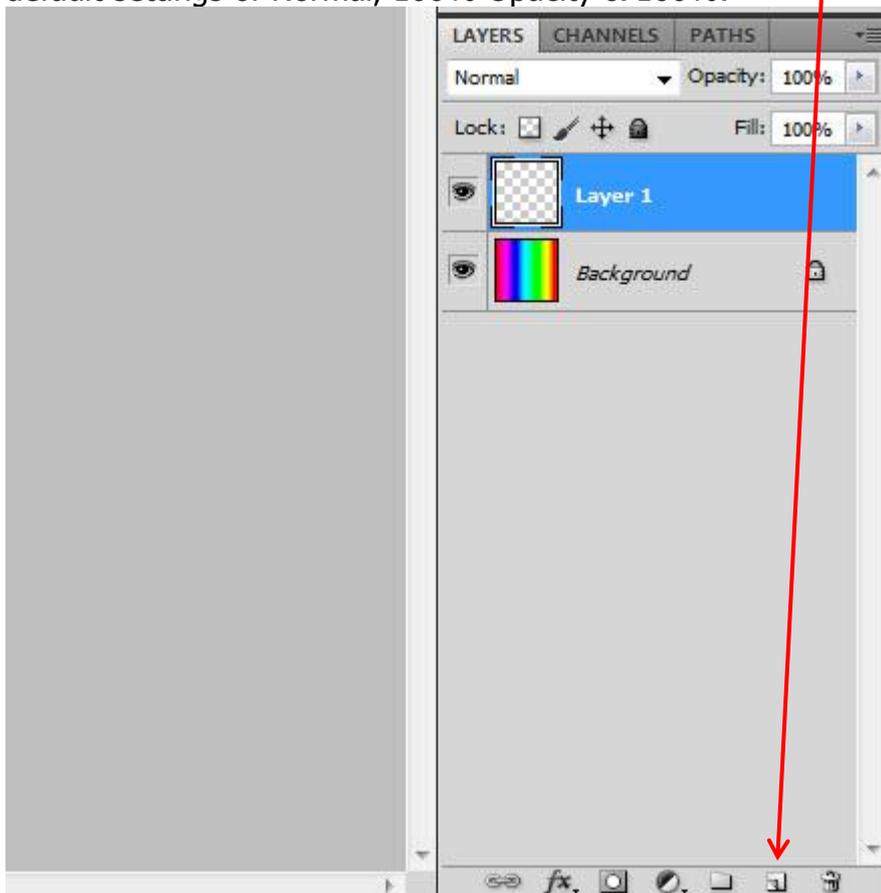
2. Select the gradient tool (G) and then, from the Gradient Picker, the gradient called Spectrum. You may have to add 'Spectrum' from the drop-down menu within the Gradient Picker. Set the Mode to Normal and Opacity to 100%.



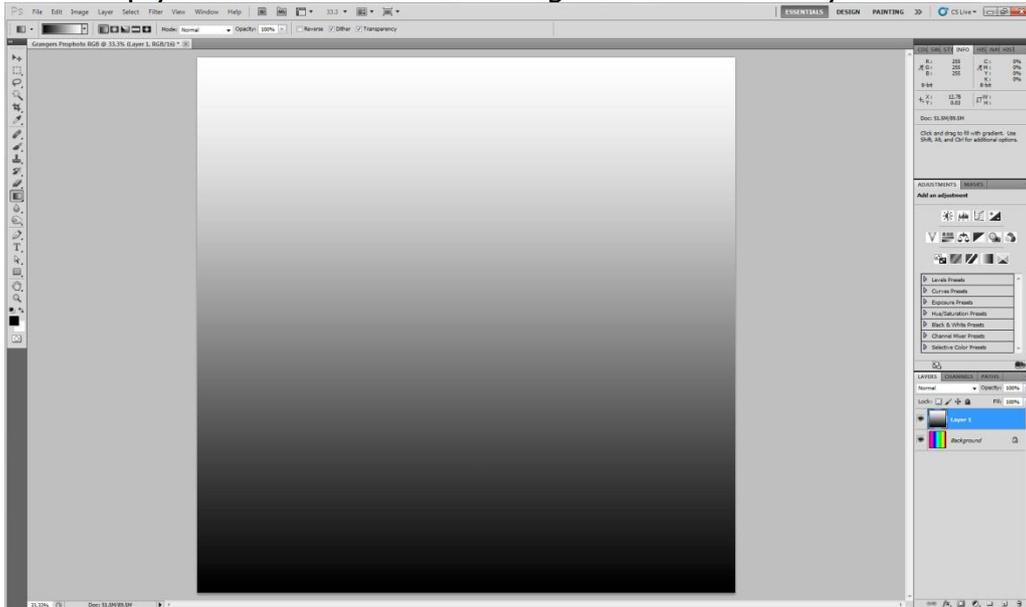
3. Draw a gradient from left to right across your document while holding down the Shift key. (This keeps the line and the gradient straight).



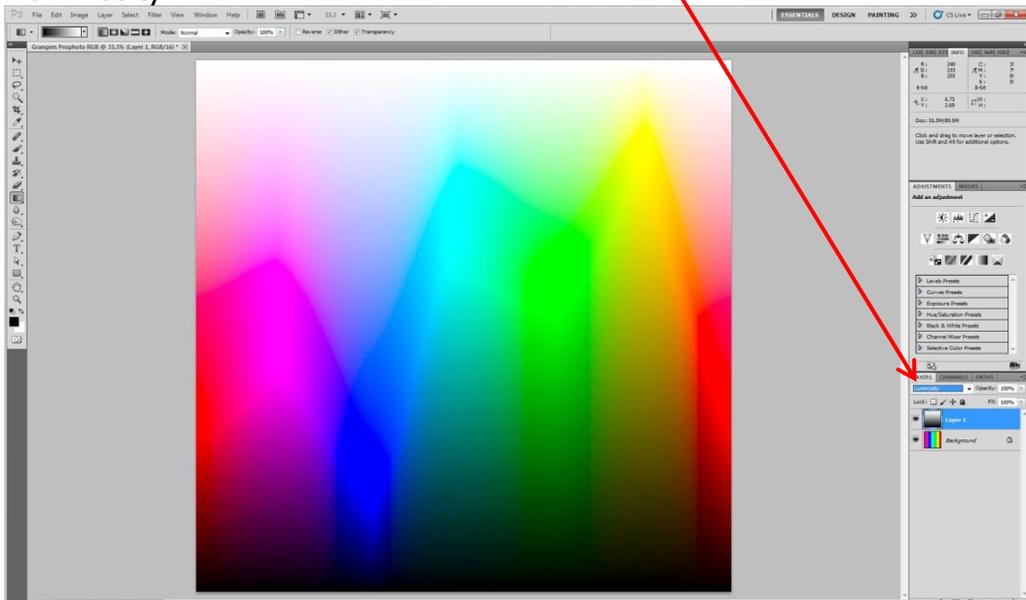
4. Create a new layer by clicking on the Create New Layer icon with the default settings of Normal, 100% Opacity & 100%.



5. Select the gradient tool (G) again, this time choose the 'Black, White' gradient from within the Gradient Picker. Draw a gradient from the bottom to the top your document while holding down the Shift key.



6. Finally, double click on the 'Layer 1' thumbnail of your Layers palette to call up the 'Layer Style' dialog box. Change the Blending Mode to 'Luminosity'.



7. Flatten the two Layers of your document, and save the file in a place where you won't misplace it. Call it: **Granger Chart Adobe** or **Granger Chart ProPhoto** (depending on which colorspace it was created with)

8. A word of caution. Because this file is mathematically derived, it contains colours which no display device, from screens to printers, can completely display properly. That's what makes it such a powerful evaluation tool.
9. Thus the web graphic shown here will likely look somewhat different to yours in its edge shading due to the restrictions of web graphics and your display.
10. create two Grangers Charts, one of them, one in the Adobe RGB space and another in the ProPhoto RGB space

Derek Doar