Adobe RGB (1998) vs. ProPhoto RGB

Are you getting maximum quality in your images and prints?

The answer is probably not!

Why?

in conjunction with

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 colours that fall outside the gamut of even **Adobe RGB (1998).**

For some images, if the goal is to maintain the maximum gamut, the only Color Space that can do so is **ProPhoto RGB.**
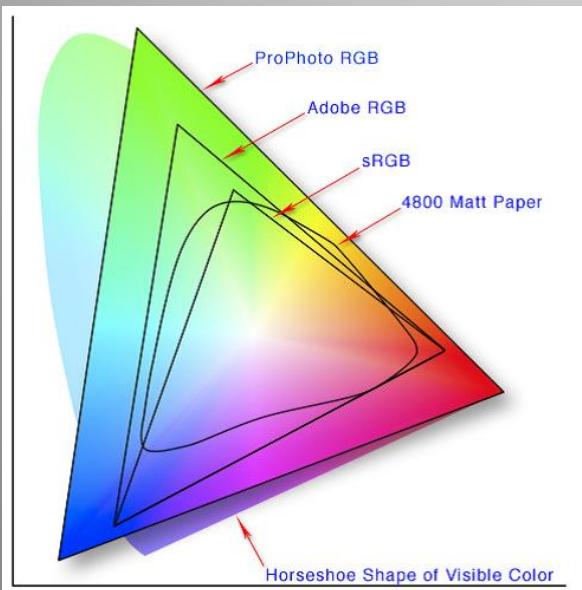
This gamut map of the various Color Spaces shows that there are colours that can be printed on an Epson 4800 that fall outside both **sRGB** and even **Adobe RGB (1998).**

ProPhoto RGB can contain all colours that a digital camera can capture–even highly saturated colours.

Cameras don't capture and printers don't print in **sRGB** Color Space.

End of extract.

Adobe RGB (1998) vs. ProPhoto RGB

Many people are familiar with Adobe Photoshop and for many years the main advice has been to process your **RAW** images using the **Adobe RGB (1998)** Color Space in Adobe Camera Raw, then set the RGB working space in Adobe Photoshop to **Adobe RGB (1998).**
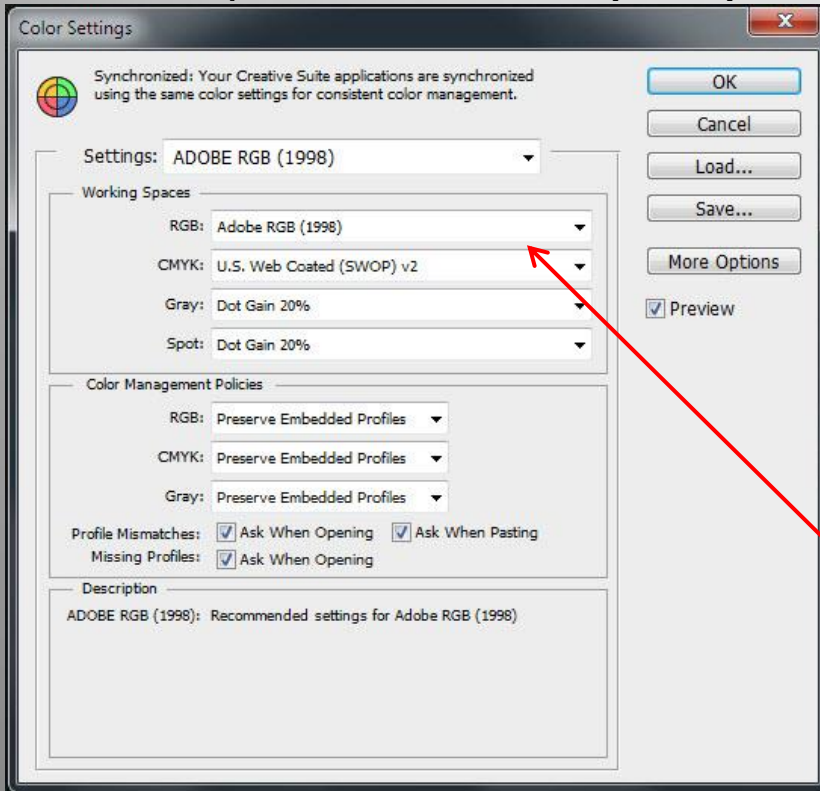
To set the RGB working space in Adobe Photoshop.
Select **Edit / Color Settings** in Photoshop to bring up the Color Settings dialogue box.

In the working Space section, you will see in this instance that **Adobe RGB (1998)** is already selected as the current working space

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Adobe RGB (1998) vs. ProPhoto RGB

Most of us would select the **Adobe RGB (1998)** as the working Color 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. (depending on the colours in the captured image)

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

Adobe RGB (1998) vs. ProPhoto RGB

- **ProPhoto RGB's** colour range is so huge that some of the colours that it supports, cannot be seen by the human vision.

- Virtually every colour a digital camera can capture and every colour a printer can print is available to us in **ProPhoto RGB.**

- So If **ProPhoto RGB** lets us work with this wide range of colours, why not use it all the time?

- **ProPhoto RGB's** biggest strength, it's massive colour range, is also the problem, or at least, a potential problem if you don't know what you're doing

- Working effectively in **ProPhoto RGB** involves capturing your images in your camera's raw format and outputting the images from Adobe Camera Raw, tagged with the **ProPhoto RGB** Color space and in 16-bit mode

- **ProPhoto RGB** is the native Color space of Adobe Camera Raw and Adobe Lightroom
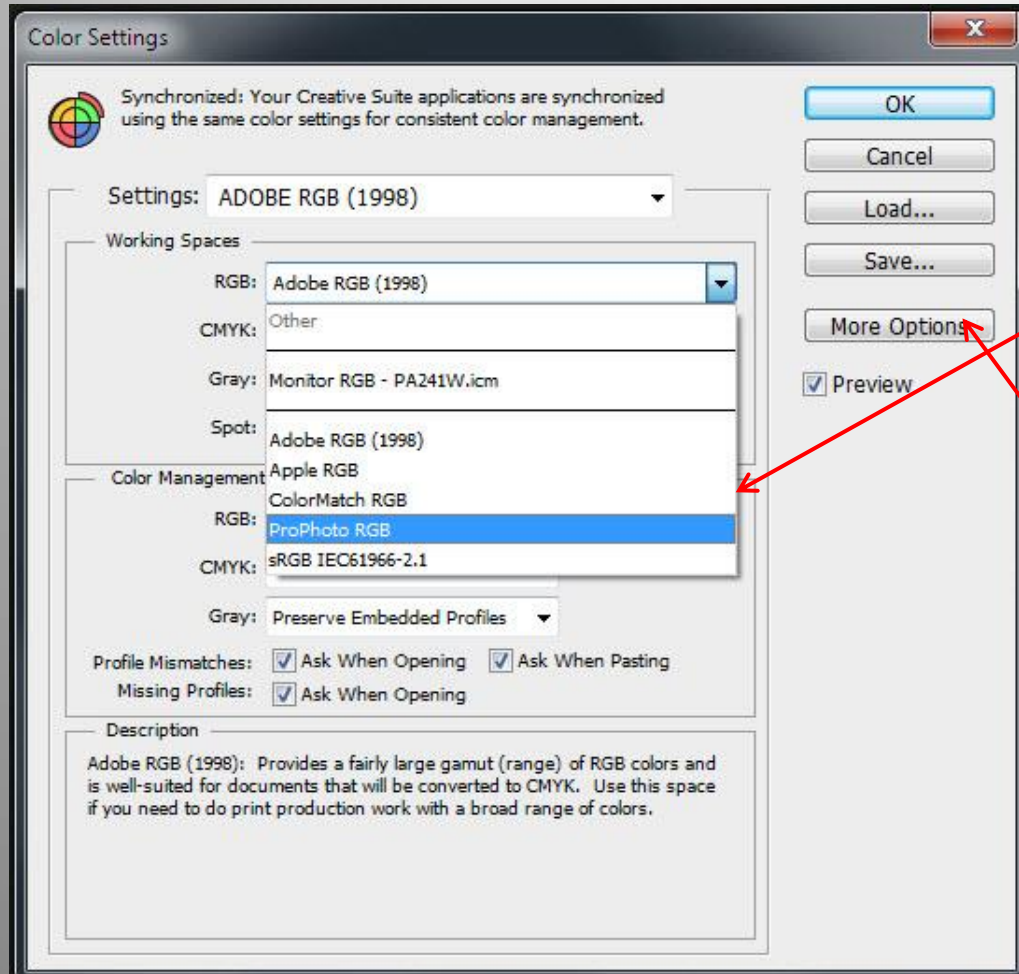
Adobe RGB (1998) vs. ProPhoto RGB

VERY IMPORTANT

- Once a **ProPhoto RGB** 16-bit image has been output from Adobe Camera Raw, it must be edited in Adobe Photoshop entirely in 16-bit mode and stay in 16-bit mode.

- The color range is so large that reducing the image to 8-bit mode will throw away a massive amount of colour information and often cause ugly color banding

- Staying in 16-Bit used to be a big problem in the past, but that was due to the fact that in Adobe Photoshop and other software, the filters were then mainly in 8-Bit.
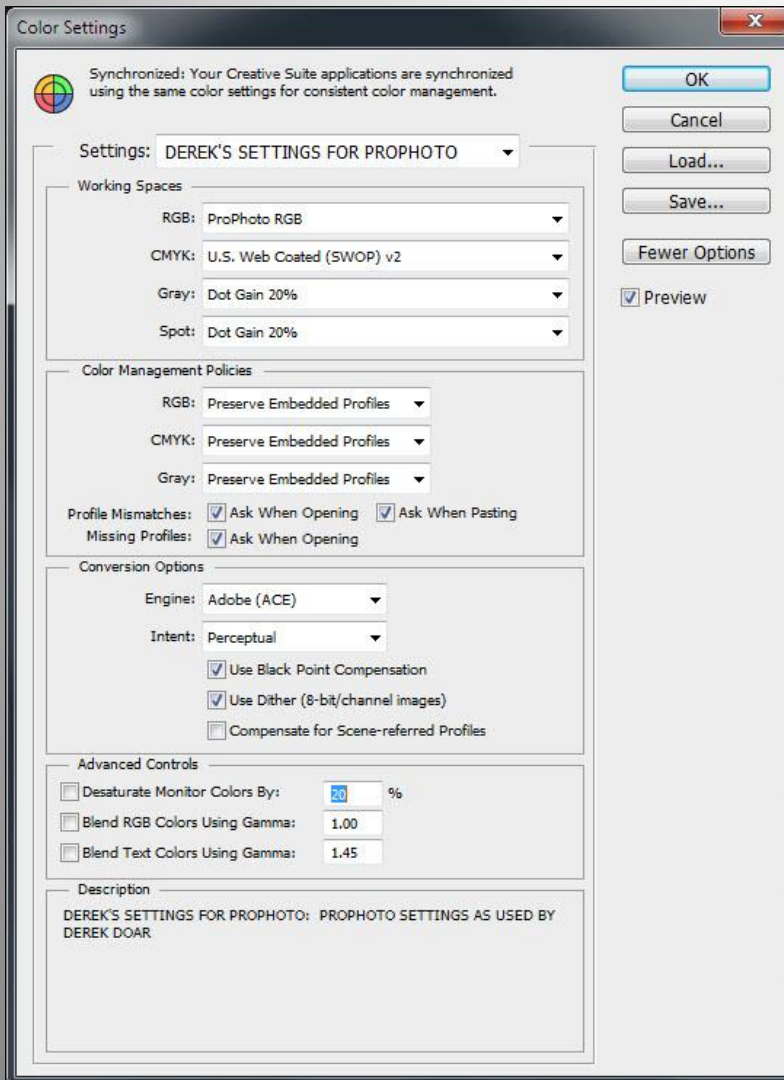
Adobe RGB (1998) vs. ProPhoto RGB

Changing Adobe Photoshop working space to **ProPhoto RGB**

Click on the drop-down menu and select **ProPhoto RGB**

Click **More Options** to expand the Color Settings panel

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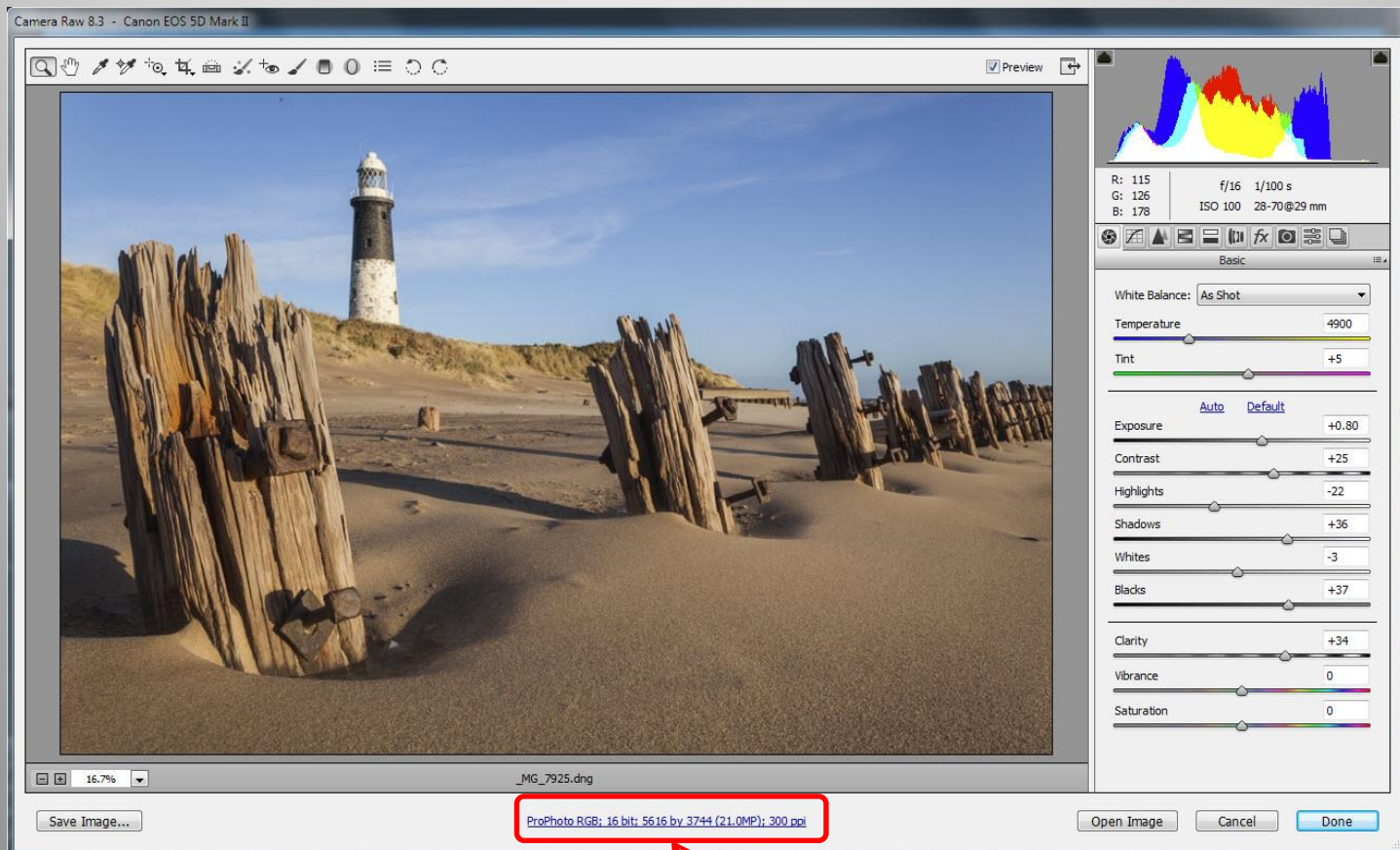
Adobe RGB (1998) vs. ProPhoto RGB

Here are my preferred Adobe Photoshop Color Settings for working with **ProPhoto RGB**

Adobe RGB (1998) vs. ProPhoto RGB

To set the Adobe Camera Raw to handle your Raw files in **ProPhoto RGB** Color Space:
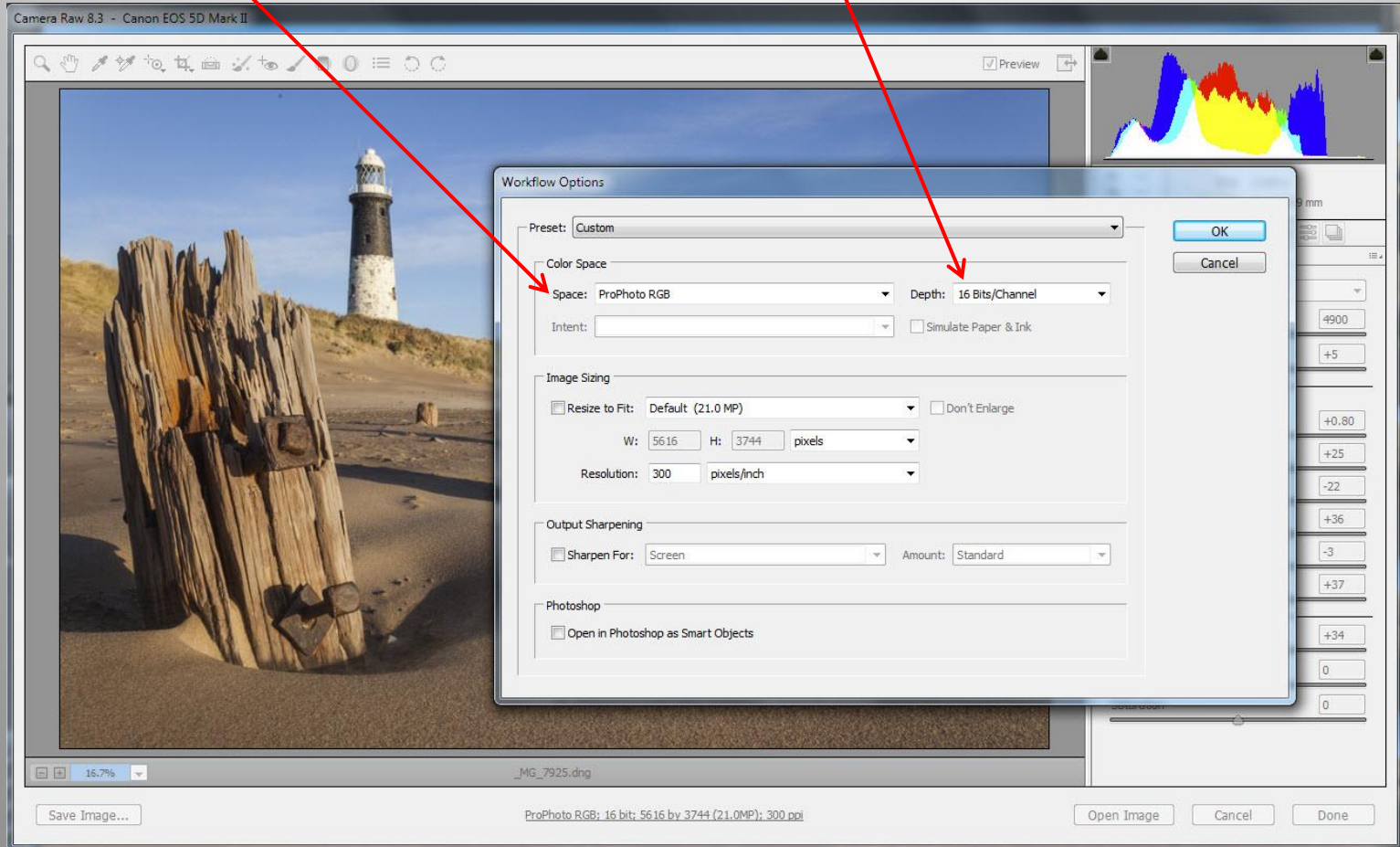Open up any raw file in Adobe Camera Raw as below.

Notice the settings: ProPhoto RGB; 16 bit; 5616 by 3744 (21.0MP); 300ppi

Click on the settings line to change the settings.

Adobe RGB (1998) vs. ProPhoto RGB

Set the **Space:** to ProPhoto RGB and the **Depth:** to 16 Bit/Channel, then click **OK**

Adobe RGB (1998) vs. ProPhoto RGB

Let us examine some facts concerning **ProPhoto RGB color space**

- **PROs**

- 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.

- in the External Editing Preferences of Adobe Lightroom, it states that, 16-bit **ProPhoto RGB** is the recommended choice for best preserving colour details from Lightroom.

- The **Prophoto RGB** color space can hold all the colour information from your camera's sensor.

- **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.

Adobe RGB (1998) vs. ProPhoto RGB

Let us examine some facts concerning **ProPhoto RGB color space**

- **PROs** (continued)

- During editing in Adobe 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 RGB (1998)** Color Space. This is due to **Prophoto RGB** Color Space beings larger than **Adobe RGB (1998)** Color Space.

- Good inkjet printers and inks are capable of reproducing saturated cyans, magentas and yellows that are outside of the **Adobe RGB (1998)** Colour Space, but within the **ProPhoto RGB** Color Space, making it a much better choice.

Adobe RGB (1998) vs. ProPhoto RGB

Let us examine some facts concerning **ProPhoto RGB color space**

- **CONs**

- All the colours of **Prophoto RGB** Color Space cannot be seen on your monitor.

- **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 RGB 1998** Color Space and reduced to 8-Bit) so banding may occur.

- Your printer cannot print all the colours of the **Prophoto RGB** Color Space. (But it may print some, that cannot be printed using the **Adobe RGB (1998)** Color Space).
  (This depends on the printer you are using)

- 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).

- 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) vs. ProPhoto RGB

Let us examine some facts concerning **Adobe RGB (1998)** Colorspace

- **PROs**

- **Adobe RGB (1998)** Color Space is a well proven color space that is used, or has been used by most discerning photographers

- 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

- If you have a good quality monitor the chances are that if you use **Adobe RGB (1998)** Color Space, you can display most of the colours that the **Adobe RGB (1998)** Color Space can hold.
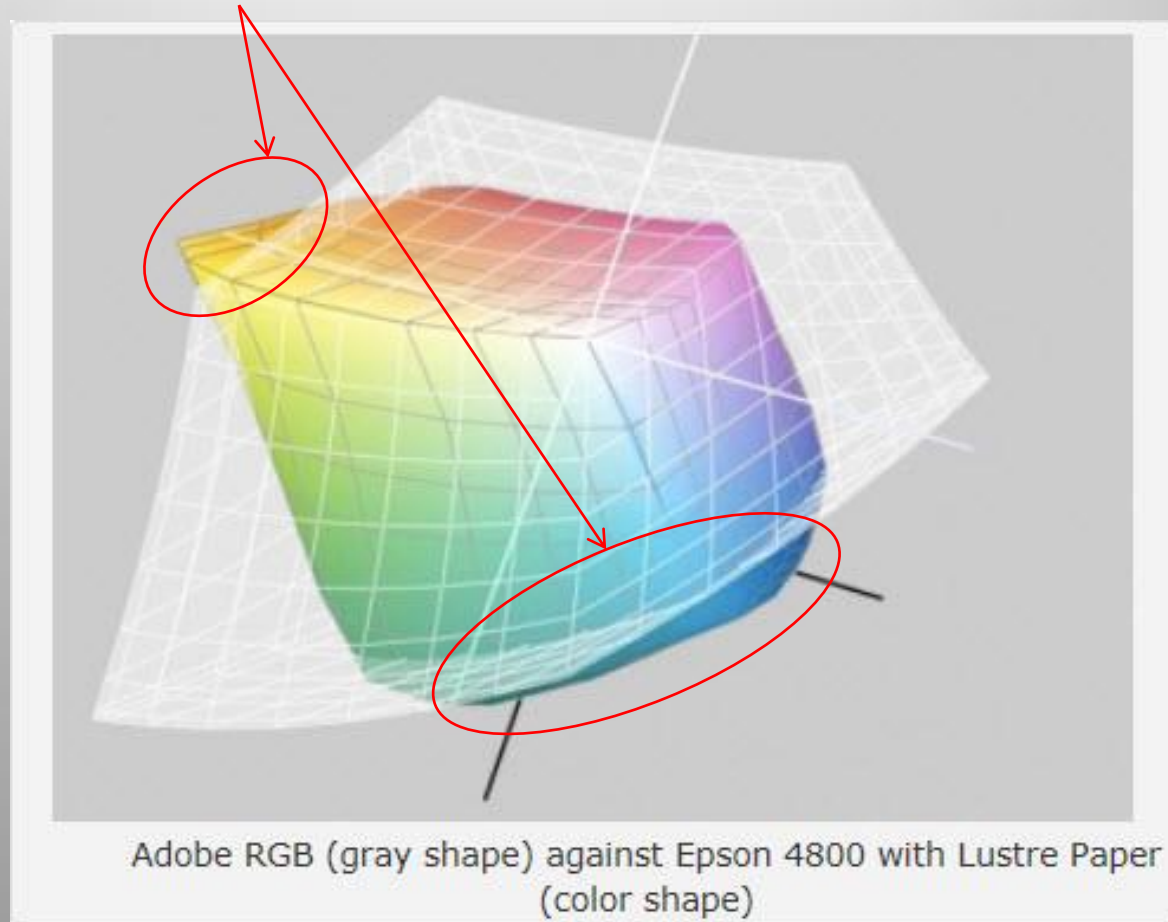
Adobe RGB (1998) vs. ProPhoto RGB

Let us examine some facts concerning **Adobe RGB (1998)** Color Space

- **CONs**

- 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.

- When a raw file is converted in Adobe Camera raw, you have the choice of outputting in different Color Spaces.
  If you chose to output the Adobe Camera Raw conversion in **Adobe RGB (1998)** color space, any information outside of the **Adobe RGB (1998)** color space is discarded and lost, because **Adobe RGB (1998)** Color Space is smaller than the native Adobe Camera Raw **ProPhoto RGB** Color Space.
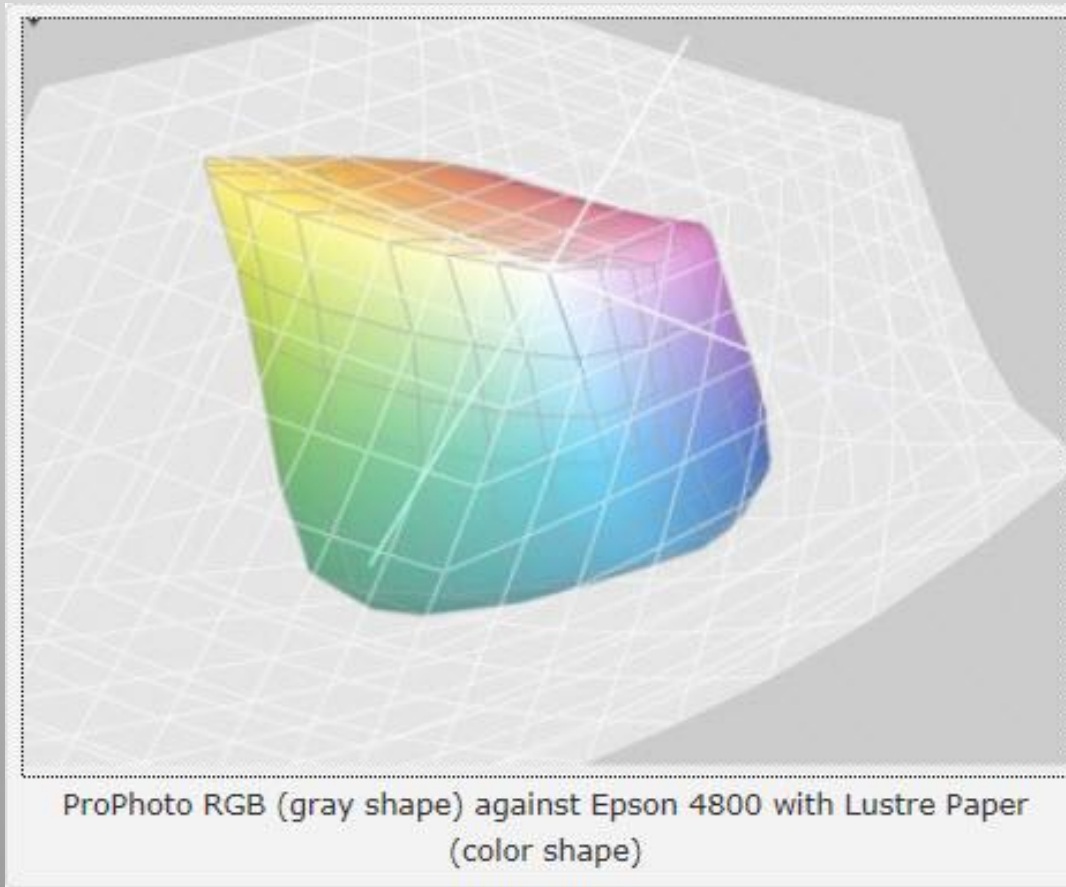
Adobe RGB (1998) vs. ProPhoto RGB

- 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.

Adobe RGB (gray shape) against Epson 4800 with Lustre Paper (color shape)

Adobe RGB (1998) vs. ProPhoto RGB

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.

ProPhoto RGB (gray shape) against Epson 4800 with Lustre Paper (color shape)

Adobe RGB (1998) vs. ProPhoto RGB

You now have 3 options.

- Stay with **Adobe RGB (1998)** Color Space.
  (A good general standard but no quality gain.)

- Output images from Adobe Camera Raw into Adobe Photoshop using **ProPhoto RGB** Color Space in 16-bit mode, then edit them.
  After editing, convert to Adobe RGB (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.

- Change to **ProPhoto RGB** color space in 16-bit mode.
  (a possible reduction in editing losses and a gain in printed output quality)

Adobe RGB (1998) vs. ProPhoto RGB

ProPhoto Test

- **If you decide to change:**

- output from Adobe Camera Raw in **ProPhoto RGB** Color Space.

- Change your default Color Space to in **ProPhoto** RGB Color Space in Photoshop **Color Settings**
  WARNING: you must stay in 16-bit mode.

- Print your images with **ProPhoto RGB** Color Space.

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](#)
[Adobe](#)

Derek Doar