

Colour Management & Profiling

Why

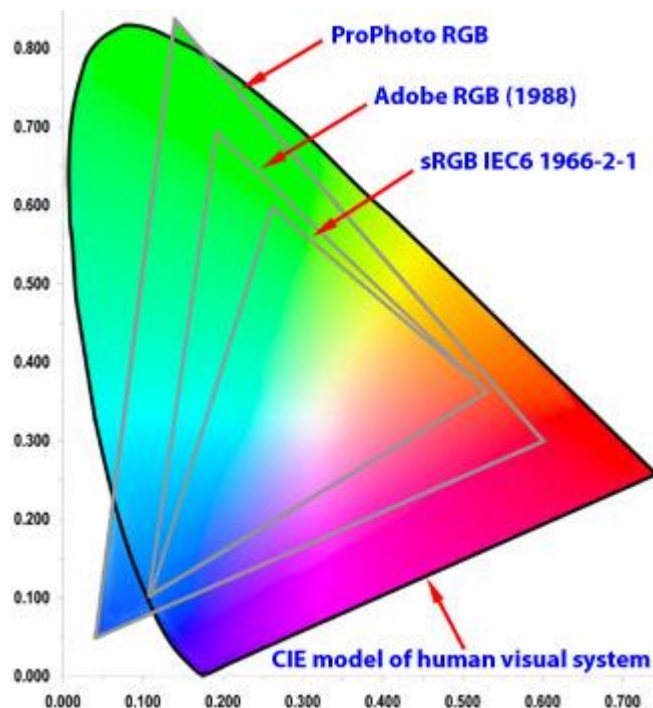
Colour management in photography is very important if we are to produce a final product (digital projected image or print) which matches what we saw when took the photography or what we created on the computer during post processing. We can spend many hours and waste paper, ink and money if we do not get this set up correctly through the workflow. We have all looked at the final print and been disappointed at how it looks – the skin colour is wrong, it looks drab and flat, colours are shown different to what we wanted.

There are three stages to colour management in our workflow – In camera, post processing, and display (screen, print or DPI), and we need to understand how each of these can affect the image and how to set them correctly. In this worksheet, I will look at each stage in the process. But before we do, let's have a look at what we mean by colour profile or colour space.

Colour Space

A colour space defines a range of reproducible colours. sRGB describes the range of colours that can be shown on a standard computer monitor or projector whereas Adobe RGB images deliver better colour rendition than sRGB when printed, but do not look as good on a monitor as an sRGB image.

The diagram below represents the two main colour spaces used in photography (Adobe RGB and sRGB) overlaid onto the colour space the average human eye can typically see. Adobe RGB covers



about 50% of what the eye can see, whereas sRGB covers only 35%. In other words, Adobe RGB has a wider Gamut.

Adobe RGB can display greater levels of colour particularly in the green and cyan range compared to sRGB.

If we start off with an image in Adobe RGB and then convert to sRGB we will throw away some of the green and cyan colours, however if we start off with sRGB and then convert to Adobe RGB we do not gain any colours. Therefore it is advisable to use Adobe RGB from the image capture through post processing, and only finally converting to sRGB (or paper profile – more about this later) right at the end.

The third colour space shown on the above diagram is ProPhoto RGB, which has an even greater Gamut than Adobe RGB, and should be used within post processing, being available in both Lightroom and Photoshop.

A quick comparison between Adobe RGB and sRGB:

Adobe RGB	sRGB
<p>Pros</p> <p>Wider range of colours (Gamut)</p> <p>More vibrant and accurate colours for prints</p> <p>Can be converted to sRGB</p>	<p>Pros</p> <p>Displays correctly for web</p> <p>Suitable for digital image projection</p> <p>Well matched to typical PC monitor</p>
<p>Cons</p> <p>Will not display correctly for web without conversion</p> <p>Will not display correctly as a digital projected image</p>	<p>Cons</p> <p>Cannot be converted to Adobe RGB</p> <p>Narrower range of colours.</p>

In Camera

This is where it can become a little confusing. Most cameras, when shooting in RAW have a native colour space which is neither Adobe RGB nor sRGB, but is determined by the sensor and processor and is greater than Adobe RGB. It is when the image is exported from the camera that colour space is decided.

I shall work on the basis that we are working in 14 bit RAW extracting the most colour information available from our camera to start the workflow.

Most cameras have an option in the menus to set the colour profile sometimes called colour space.

Nikon

For example, Nikon have the option in the shooting menu: (note some Nikon cameras may show different menu options).



Canon



- 1 **Select [Color space].**
 - Under the [] tab, select [Color space], then press <SET>.
- 2 **Set the desired color space.**
 - Select [sRGB] or [Adobe RGB], then press <SET>.

File Naming

File naming in the camera is used to differentiate whether the image is in Adobe RGB or sRGB colour space, for example:

- a) Adobe RGB images are named as _DSC1000.NEF (.TIF or .JPG)
- b) sRGB images are named as DSC_1000.NEF (.TIF or .JPG)

This is a standard convention and is common to most camera manufacturers, including Canon, although using a .CR2 suffix.

Recommendation

The recommended option here is to set the colour space in the camera to Adobe RGB, as this gives the most options and potentially a better image as starting point for post-production or editing.

Post Processing

Having set up our cameras to use the correct colour space, we now need to look at how we edit the image. Here we have four options available:

- a) Lightroom
- b) Photoshop (via camera RAW)
- c) Camera manufacturers proprietary software
- d) Other image processing software - e.g Paintshop Pro, GIMP DXO etc. and including stand-alone RAW processing.

At the moment, I shall concentrate on just the first two options, but will look more closely at the proprietary software from Nikon and Canon in the future.

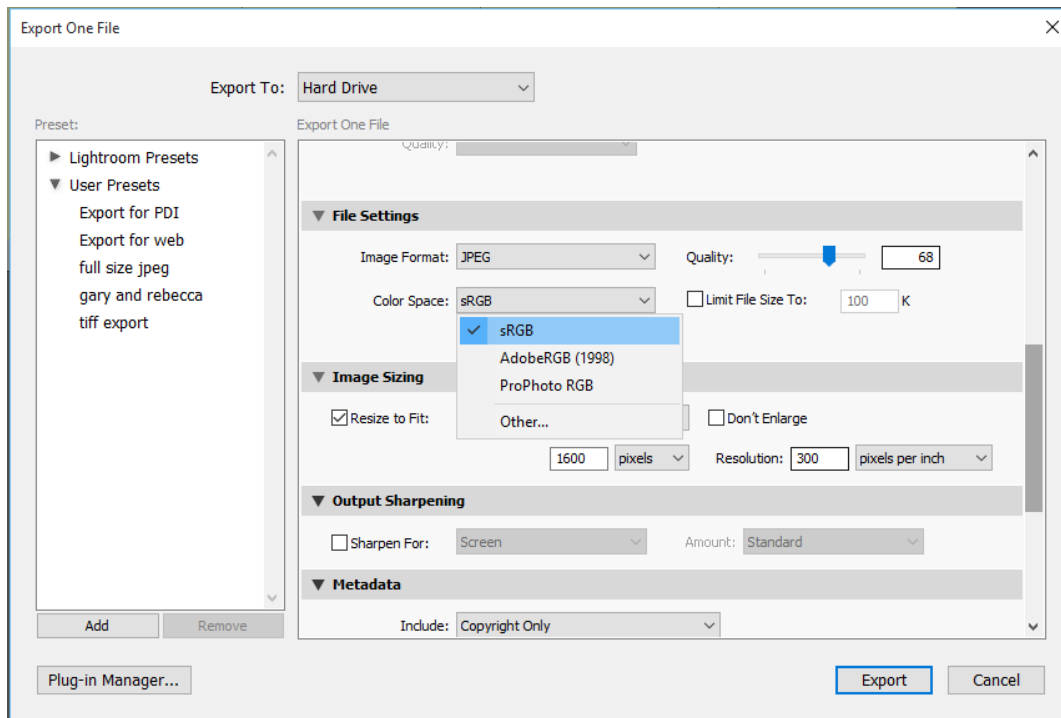
Lightroom

There are no options available in Lightroom to set the colour space for images, as Lightroom is pre-set to use either Adobe RGB or ProPhoto RGB as explained below.

Lightroom primarily uses the Adobe RGB color space to display colors. The Adobe RGB gamut includes most of the colors that digital cameras can capture as well as some printable colors (cyans and blues, in particular) that can't be defined using the smaller, web-friendly sRGB color space.

Lightroom uses Adobe RGB:

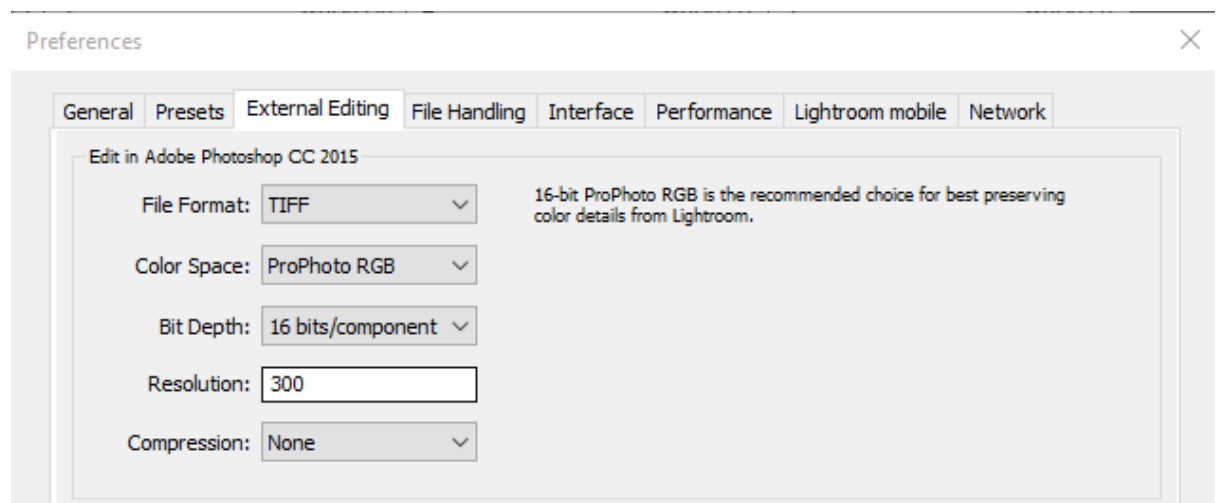
- for previews in the Library, Map, Book, Slideshow, Print, and Web modules
- when printing in Draft mode, we will come back to printing in a later section
- in exported PDF slideshows and uploaded web galleries



In the Develop module, by default Lightroom displays previews using the ProPhoto RGB color space. ProPhoto RGB contains all of the colors that digital cameras can capture, making it an excellent choice for editing images. In the Develop module, you can also use the Soft Proofing panel to preview how color looks under various color-managed printing conditions.

When exporting images into an external editing program, for example Photoshop, we can set the default colour profile to use from:

Edit / preferences / external editing tab



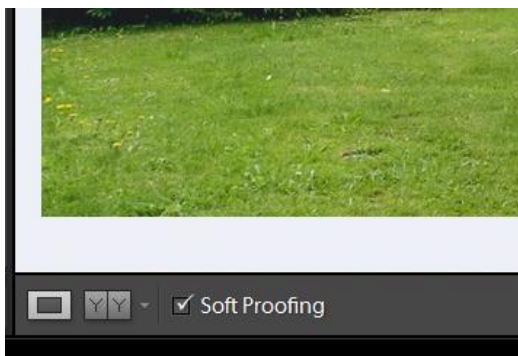
It is here where we need to set the colour space to ProPhoto RGB, as this will give consistency when editing in Photoshop. The options shown for File Format, Bit Depth and Resolution should also be used for best results.

One further aspect of the Lightroom develop module I want to look at here is Soft-Proofing of images. This will show on screen how the image will appear when printed, and allow you to fine

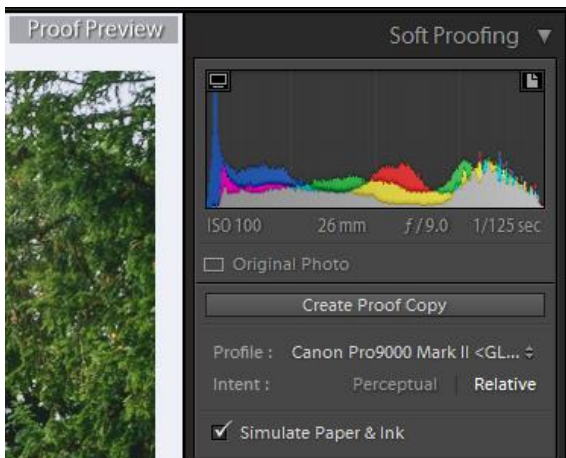
tune your image. This will also show a warning for any part of the image which is outside of the Gamut –

- Colours outside of the printers capabilities will appear red in the image preview area
- Colours outside of the display's color capabilities appear blue in the image preview area
- Colors that are outside the gamut of both the monitor and destination device appear pink in the image preview area.

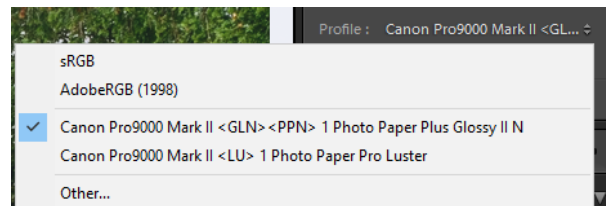
To enter Soft Proofing mode, tick the box in the status bar at the bottom of the Develop Module.



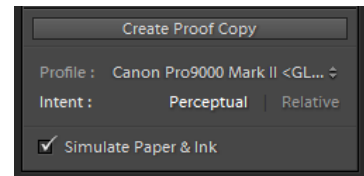
Three things will happen – The border around the image will turn white; the text “*Proof Preview*” will appear in the top right of the image window; and the soft proofing panel will appear.



This is where we can try out different profiles for example:



Or intent;
Perceptual or
Relative:



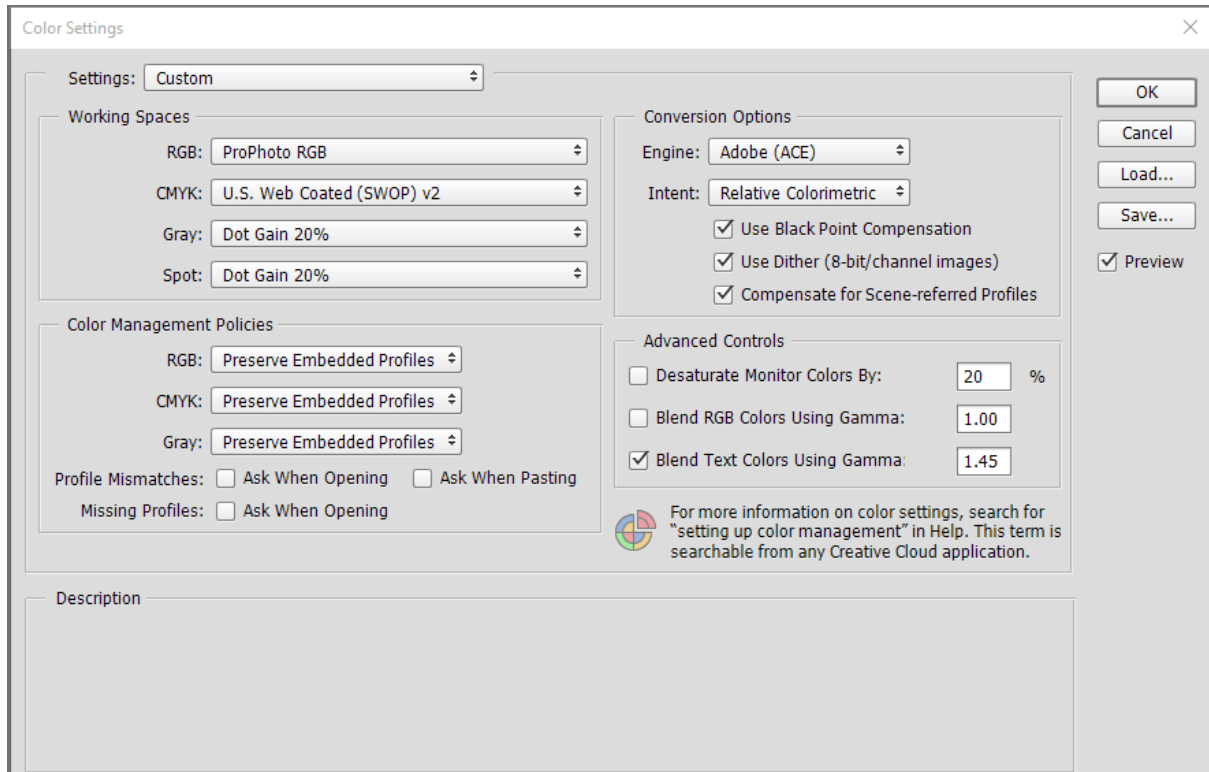
Photoshop

Before starting to work with Photoshop we do need to set it up so that it works as we need, and the defaults are set correctly.

Firstly, we need to set the working colour space, which is found under

Edit / color settings

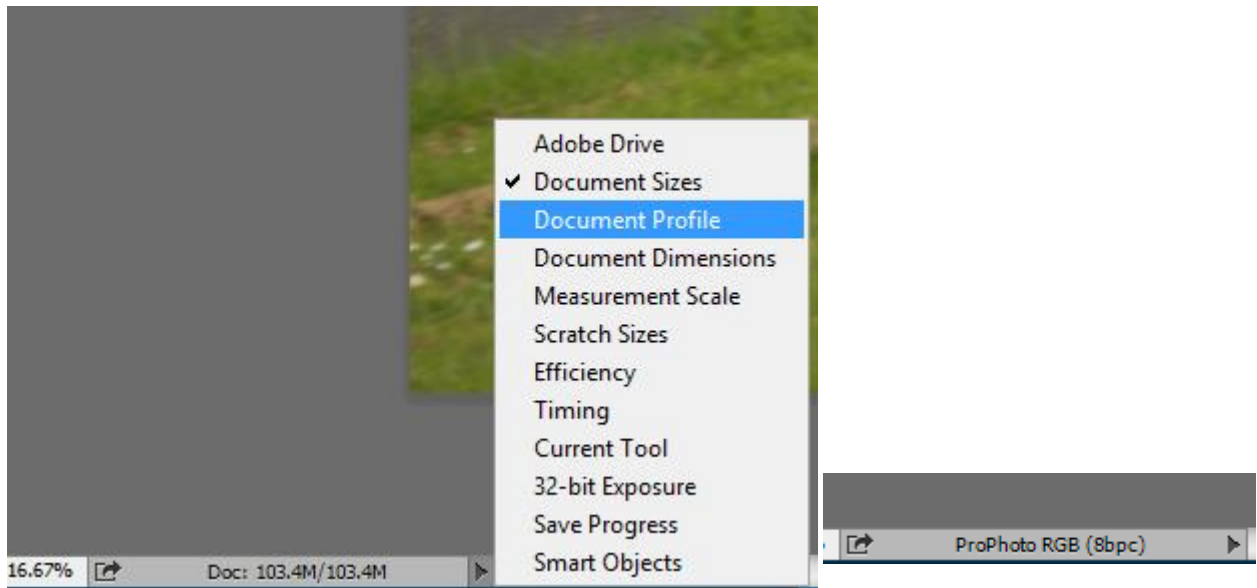
This then opens up a panel with a number of options available:



Now, working through the settings: (I have shown the most important settings in red, all others can be left as default)

Working Spaces	RGB	Set to ProPhoto RGB for consistency with Lightroom
	CMYK/Gray/Spot	Leave as set
Colour Management Policies	RGB	<p>We have three options here:</p> <ul style="list-style-type: none"> • Off: do not use • Preserve Embedded Profiles • Convert to Working RGB <p>We have a choice here, if we preserve embedded profile, then no matter what the profile is of the image we are importing Photoshop will not change it; If we select convert to working RGB, and we have set this to ProPhoto RGB, then Photoshop will convert the image to the Working RGB.</p> <p>I would suggest we set this to convert to working RGB, then when the image is imported it will be changed to ProPhoto RGB (chose Ok to open file), and we will have consistency with Lightroom.</p>
	CMYK/Gray	Preserve Embedded Profiles
Conversion Options	Engine	Leave as Adobe (ACE)
	Intent	Out of the four options, Relative Colorimetric is the recommended choice
Advanced Controls		Leave as default

If you are unsure as the colour space of the image you are working on, a very quick way to check is to look at the bottom of the screen, where you will see a small arrow, click on this and select Document Profile:



When importing an image via Camera Raw, the image will open with the colour profile set in the Camera, but will then convert to the working RGB, as it opens into Photoshop.

Display (Print and Projection)

Having worked on our image, we have a final product which we are happy with, but we now need to make sure that when it is viewed, the image colours, brightness, contrast etc., are as we have seen them on screen.

This is where display and print profiles become important. There is no point in spending time creating a wonderful image on our computer screen if the screen does not show colours properly, i.e. it is out of configuration. No matter what we do in this situation, we will never get the printed image or even projected image to look right, we will just waste money and not show our work at its best.

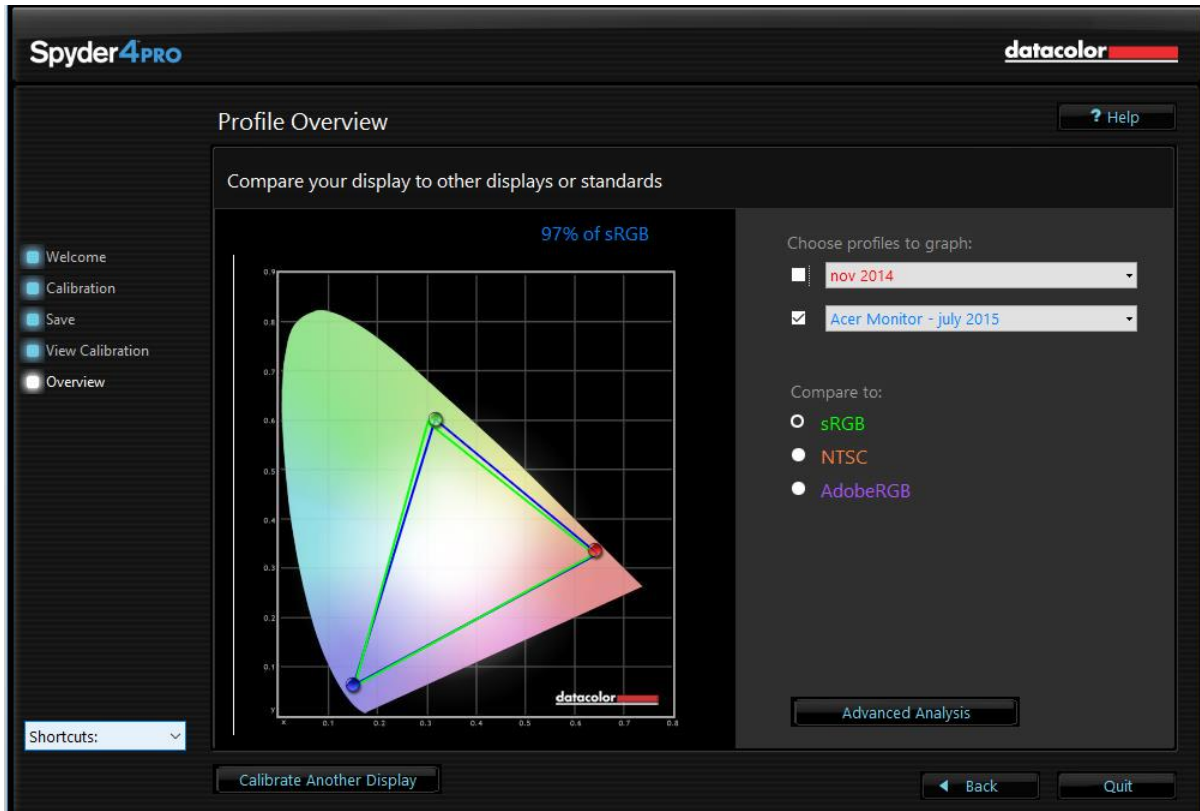
Now LCD screens are much better than the old CRT displays, but they do need to be profiled, when first set up, and then once a month or so.

Display screen profiling is carried out using a specialist device such as:

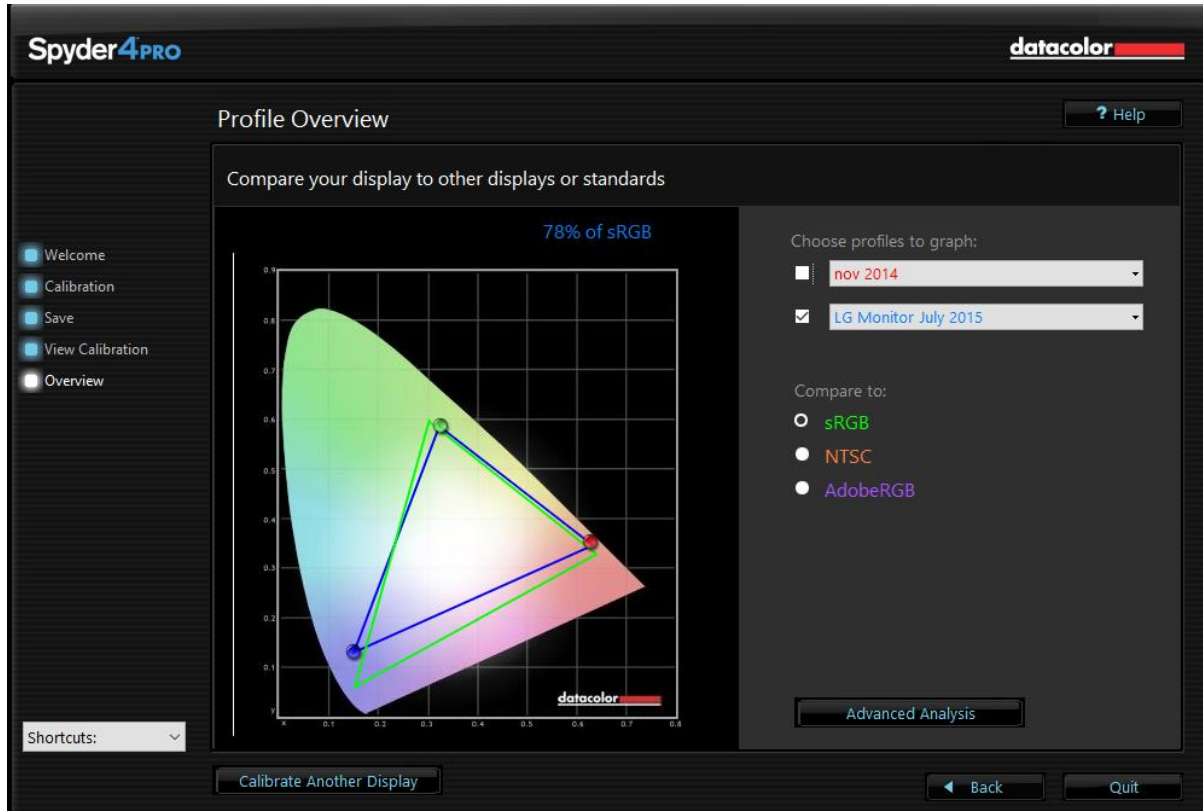
- Datacolor Spyder (Express, Pro or Elite)
- Xrite ColorMunki (Smile, Display, Photo)

Both tools are easy to use, and the software guides you through the process. The Datacolor Spyder produces a graph for each screen profiled comparing the screen to sRGB and Adobe RGB. For

example, my main monitor is a very close approximation to sRGB (and 74% of Adobe RGB).



But my second monitor is much worse than this (and it has been profiled as best as it can be) – it does need replacing.



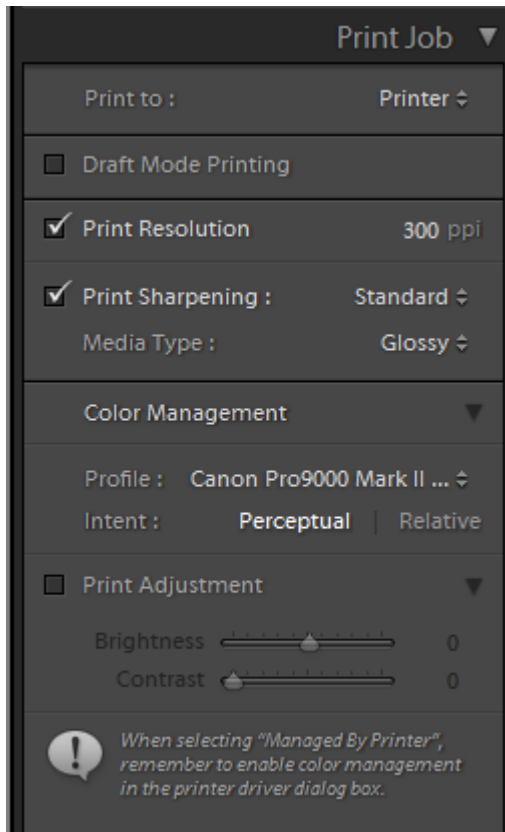
Which just goes to show that not all monitors are equal!

Print

Now we come to finish our workflow with a accurate print of our image, this can be achieved in either Lightroom or Photoshop.

Lightroom

We need to go into the Print Module, and assuming we have already set up the print size, paper size and orientation etc., we then need to look at the Print Job section of the right hand panel.



Either to a printer or jpeg file

Leave unticked

300 ppi is normal resolution for most printers

Deselect if sharpening done in develop module
This depends on paper type

Choose profile for your printer, ink and paper
Perceptual if many out of Gamut colours
Relative if few out of Gamut colours

Print adjustment Brightness and contrast give a final optional adjustment

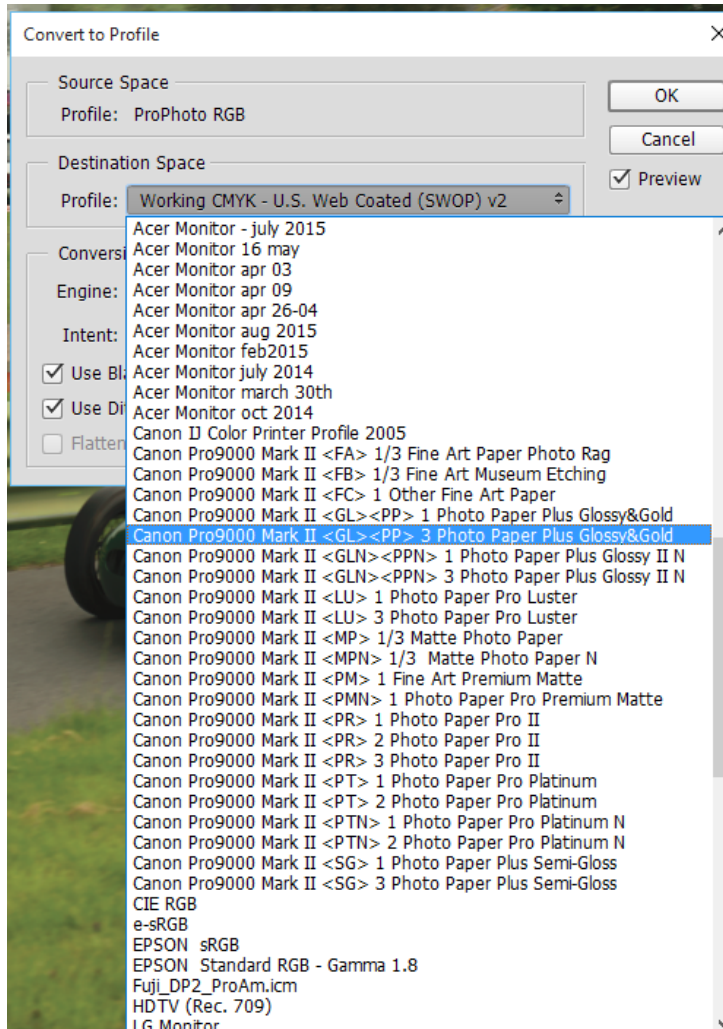
The Perceptual or Relative intent options can be problematic, as it is difficult to choose which one is most applicable. As a starting point, I would suggest Perceptual intent only because most printers may have a smaller Gamut than Adobe RGB and as a result many out of Gamut colours, but it is one of those options to try both and select the one which looks best.

Photoshop

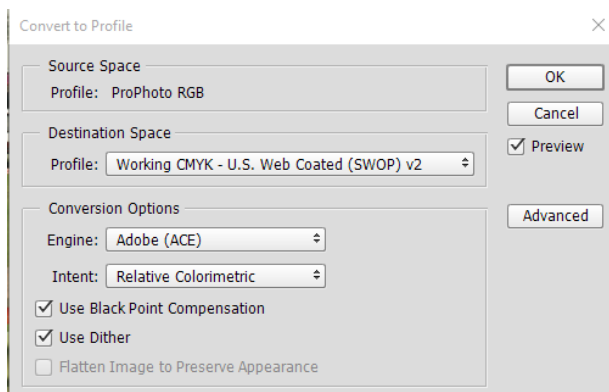
Choosing printer profiles is carried out differently in Photoshop. We need to convert the image to the profile that we want to use, by using

Edit / Convert to Profile

This opens up the following where we can select the correct profile for our printer, paper type and ink type.



We have a couple of further options to consider



Engine – keep as default

Intent – as for Lightroom above.

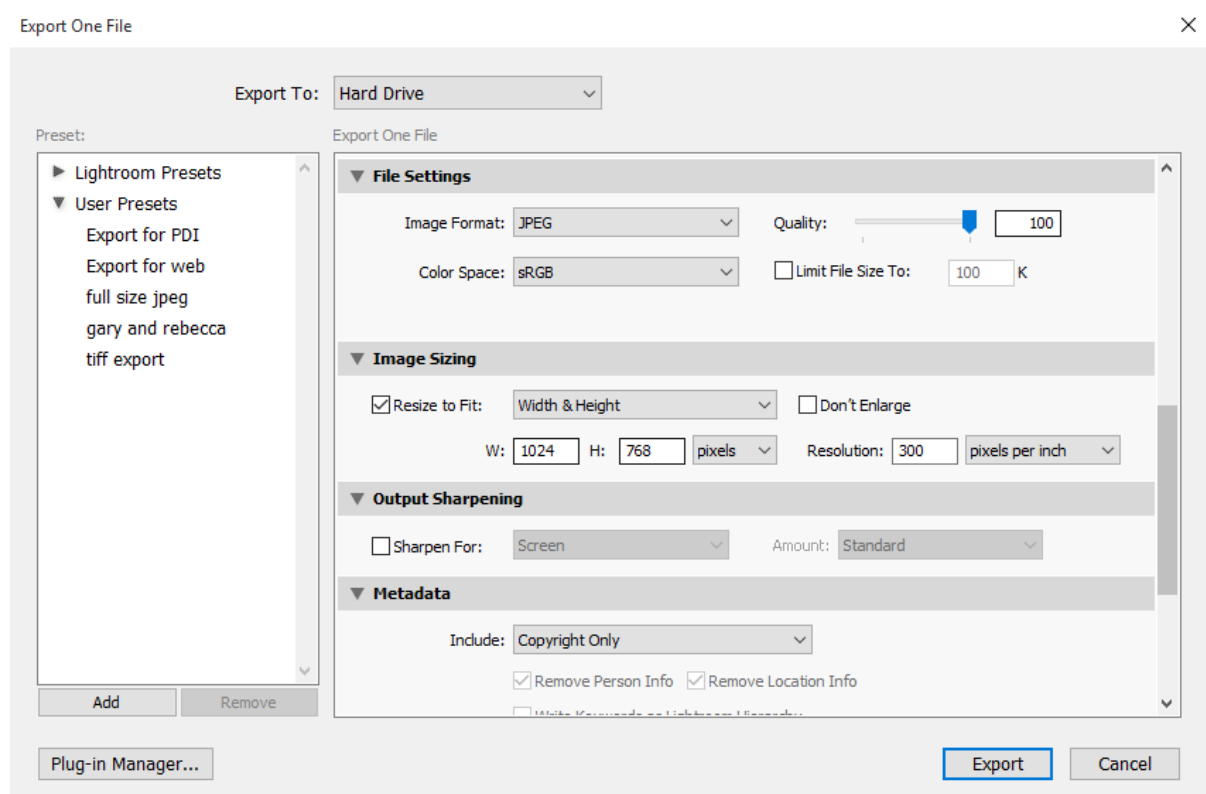
Black point – preserves shadow detail

Display (DPI)

This is where we can produce our image in a format for projection.

Lightroom

In Lightroom, we need to export the image from the Library module. Here we right click on the selected image, or select the image and click export at the bottom left of the screen. Assuming that we have selected a folder to export to, renamed as required, we come to file settings:



Here we set the colour space to sRGB, file type to jpeg, quality to 100 and we can set the width & height to 1024 x 768.

With the image size, do not worry if the image is not in these proportions, Lightroom will automatically set either the height or width to a maximum of 1024 or 768.

Leave sharpen unticked.

Photoshop

Photoshop is a little more complicated in that we have a two or three stage process, but many more options in how we wish to display our image.

Again, assuming we have completed our image, and it is ready to be set up for digital projection.

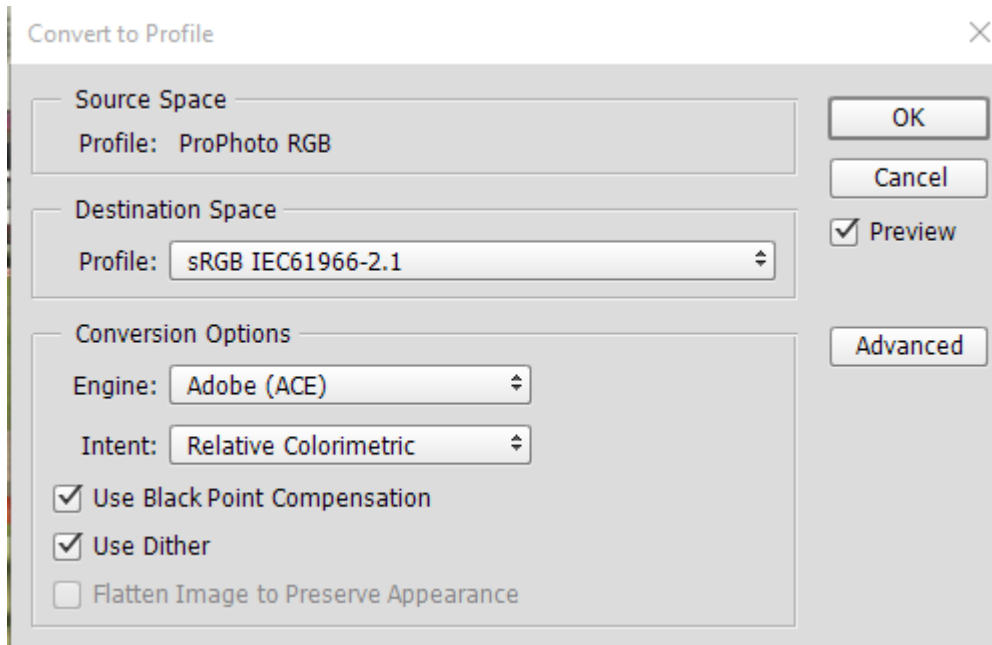
Firstly in older versions of Photoshop, we need to convert the image to 8 bit (Photoshop CC does this automatically as part of the process).

To convert to 8 bit –

image / mode / 8 bits per channel

Then we need to convert the image to the correct profile for projecting – sRGB.

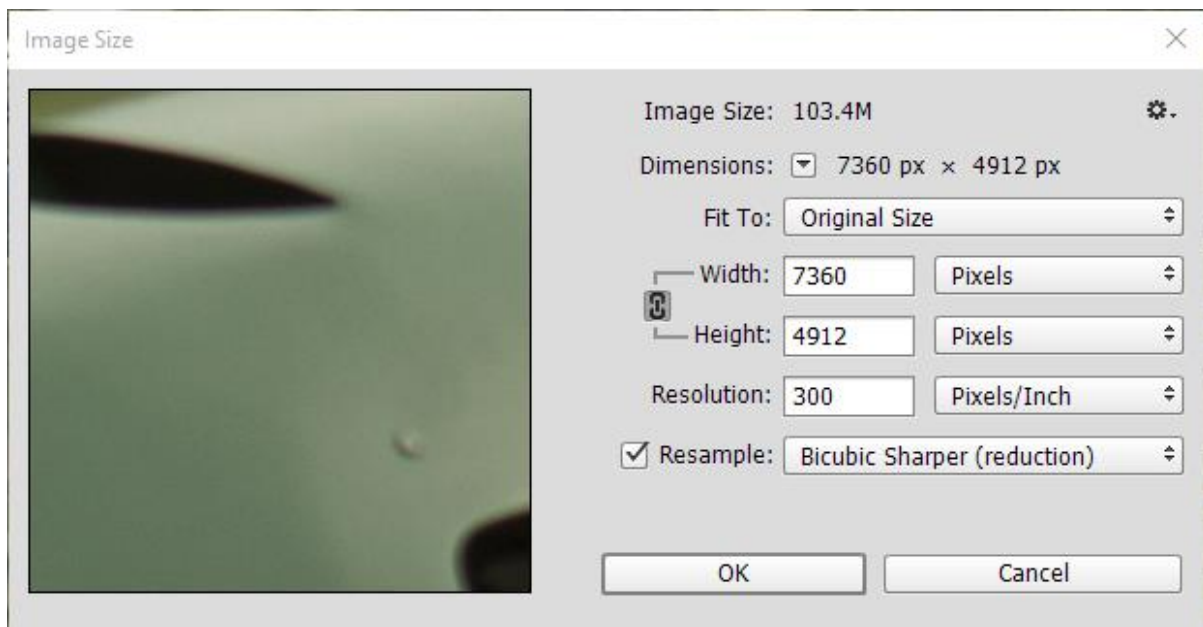
Edit / convert to profile



And choose the correct profile – all other options as previously mentioned.

Finally, we need to convert the image to the correct size:

Image / image size



Change width and height to 1024 x 768. (you only need to change one dimension, the other will change automatically). Resample should be set to “Bicubic Sharper (reduction)” for best results.