RetouchPRO

Ink Jet Printing Primer

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Prerequisites

- Start with the best possible data: GIGO:Garbage In Garbage Out! Conduct as much global tone and color correction from raw data in Adobe Lightroom or Camera Raw.
- Calibrate and profile your display, have good printer profiles*
- Control ambient conditions around display, have proper lighting for print evaluation ("Daylight" Light Box, Solux lamps).
- Use soft proofing to evaluate image based on output.
- Properly sharpen image for output conditions and size.
- Setup print driver correctly.

*Excellent ICC profiles for all Epson papers can be found on the Epson Pro website and most are installed by the print driver.

Light boxes http://www.gtilite.com/

Solux lamps:http://www.solux.net/cgi-bin/tlistore/infopages/index.html
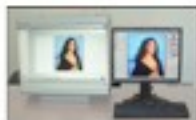
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Buying a printer

- Consider how many prints you will make, more expensive units have larger ink cartridges which can more than make up the differences in ink savings. Epson 2880@ $1.27 per ml, 3880@ $0.75 per ml for the same Magenta Ink.
- Do you need both roll and sheet printing?
- Is a system level print driver available or do you have to use a Photoshop Export plug-in?
- Consider Maintenance costs (tanks, switching inks etc).
- Higher end (read more expensive) printers may have built in network support rather than a single user USB connection.

Original Equipment Manufacturer Driver Types
What to send to your printer

- Most OEM drivers are either Quickdraw (Macintosh) or GDI (Windows) and can only handle RGB raster data.
- The "black box" in the driver converts RGB to CMYK (or CcMmYKk+ as an example of a 7 color ink jet printer).
- User has no control over conversions.
- OEM supplied drivers usually only support their own paper types for ink delivery. 3rd party papers can be used but finding the optimal driver settings for ink delivery can be hit or miss.
- Without control over ink delivery, some papers produce poor quality output with little or not way to fix the issue.
- Better RIPs do not suffer these limitations due to their control over ink delivery.

Do you need a RIP?
Advantage RIP:

- Bypass original manufacturer print driver
- Ability to control individually ink coverage
- Superior dither (dot pattern)... Maybe.
- Ability to use more than 8-bits per color. Newer Epson and Canon printers provide this.
- Ability to print neutral B&W or toned B&W. Newer printers provide this.
- Ability to print very large prints and resize files.
- Ability to gang up multiple images without using Photoshop.
- Print Queues for added productivity.
- Ability to send CMYK directly to printer (ideal for proofing).

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RIP: Raster Image Processor. A RIP is often a software product that accepts vector or PostScript data, takes this mathematical representation of a shape or element, and creates a series of dots necessary to output the shape. A RIP takes raster data and produces bitmap data necessary for output.

Disadvantage RIP:

- Expensive! Many RIP packages cost nearly as much as your printer. Virtually all products require activation key (dongle).
- Complicated. Not known for ease of use so expect a steep learning curve. Be sure to check tech support options from manufacturer or dealer before buying.
- May not support your printer or printers you may use in the future.
- Some RIPs are primarily designed for prepress and CMYK reproduction needs. Select a RIP based on your needs. Fortunately a new class of RIPs has been "designed" for the photographer or those only interested in photographic output.

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Other capabilities

- Tiling. This is the ability to print a single large image on several sheets or pages to produce banners or panoramas. Some RIPs allow precise control over spacing for cutting and pasting multiple tiles.
- Borderless printing to fill entire sheet with an image (full bleed)
- Layout tools to quickly align multiple images.
- Packages and templates (supplied and user defined). Allows single or multiple images to be quickly placed into preset sizes.
- Many of these capabilities are found in Adobe Lightroom's Print Module.

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Non Linear Behavior

ImagePrint 90%   ImagePrint 100%   Epson Driver (NCA)
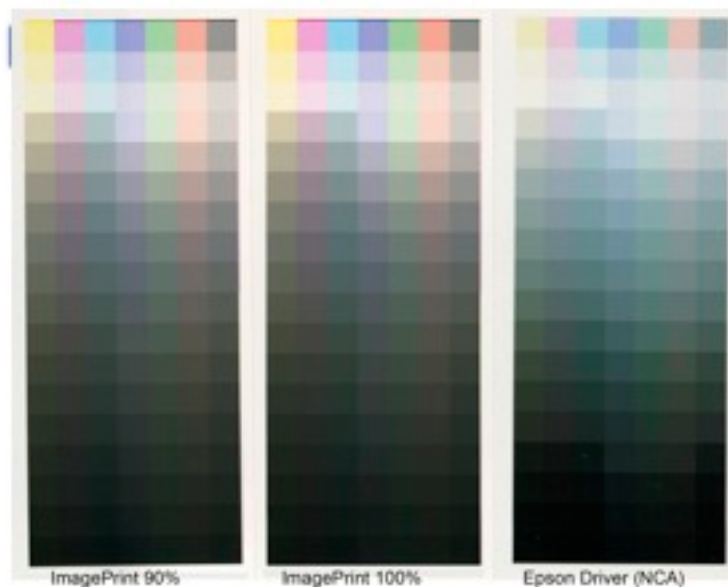
The output on the far right is from an RGB file sent through the Epson driver after selecting the correct paper but using the "No Color Adjustment" setting to provide the widest gamut color. Not only is there too much ink being used unevenly through the tones but there is an obvious and heavy cyan color cast. The image in the middle is the same file sent through the ImagePrint RIP using the default 100% ink limit for each ink. This is far more linear and the color and gray balance is excellent. The image on the far left was printed the same way with 90% ink limits for each ink. Visually viewing the two prints from ImagePrint shows that 90% is a little better in terms of the very last darkest set of patches. In ImagePrint, the file was sent as an untagged document with the Bitmap tab set to "none" which passes the data straight to the RIP (no color management). The paper used here was Epson Enhanced matt and the prints were scanned on an Imacon 848 with no sharpening.

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Urban Legends

- At this point, we should put to bed the tired myth that digital cameras capture sRGB: the truth is, we've never seen a camera that was 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 RGB color space that can do so may be ProPhoto RGB. The gamut of most modern, Prosumer and Pro level ink jet printers easily exceed that of Adobe RGB (1998).

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RGB Working Spaces

Used in Photoshop, Lightroom and Camera Raw... But which one?

Ideally the working space can contain all captured colors and colors you wish to output. The "big 3" are:

sRGB: Smallest Gamut. Good for the web. Gamut of most displays.
Adobe RGB (1998): Useful gamut for many output needs but larger than the gamut of most displays. New display technology matches and exceeds.
ProPhoto RGB: Excellent in raw workflow's. Not appropriate for 8-bit editing. Many possible colors outside display gamut!

While two of these working spaces can contain colors you may not see on your display*, you will be working with many devices that can reproduce these colors.

*Newer, Adobe RGB wide gamut displays reduce this to issue.

ProPhoto RGB is supported in Adobe Camera Raw and I've been using more and more as often I find I have images that exceed the gamut of Adobe RGB (1998). I encode the data into ProPhoto RGB in 16-bit.

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Soft Proofing in Photoshop
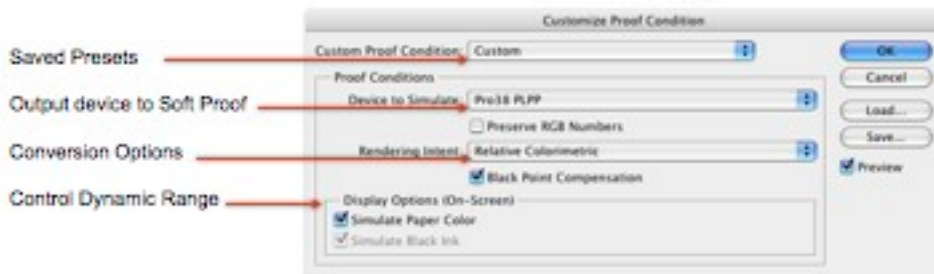### Lets see a soft proof before we print!

- Use Photoshop's Customize Proof setup and load your output profile.
- Edit in your RGB Working Space **WHILE** viewing the output simulation(s).
- Once you edit for a specific output device, edit on a copy or Layer! The original file in the RGB working space is your "master" which you will go back to each time you wish to print it.
- Always show client images on-screen with the soft proof! If you show them the RGB preview, that's what they will expect you to provide and that's not possible!

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Soft Proof: A term that describes the process of using ICC color management to produce a preview of an image on screen that simulates (proofs) how that image will output to a specific printer. For those working with untagged files or files that are in an print/output space (CMYK specifically), it is useful to see what the document would look like if the current set of numbers were simply sent to the printer "as is." For example, I'm provided a document in U.S. Web Uncoated (SWOP) v2 but the document will be output to a device where Eurocoated v2 is the behavior of the device. By un-checking Preserve Color(CMYK in CS2) Numbers, a soft proof is produced showing what the output would look like if those numbers from SWOP were sent directly to the output device that prints Eurocoated. I can then decide if it's appropriate to send the U.S. Web Coated (SWOP) v2 document to the Eurocoated printer or if some conversion or editing is necessary, based upon what I see displayed.
NEVER allow the client to see the image without a soft proof or they will expect this on output (which is impossible).

Custom Proof Setup

Customize Proof Condition

Saved Presets → Custom Proof Condition: Custom

Proof Conditions

Output device to Soft Proof → Device to Simulate: Pro38 PLPP

☐ Preserve RGB Numbers

Conversion Options → Rendering Intent: Relative Colorimetric

☑ Black Point Compensation

Display Options (On-Screen)

Control Dynamic Range → ☑ Simulate Paper Color
☑ Simulate Black Ink

OK / Cancel / Load... / Save... / ☑ Preview

- Presets can be selected after you configure and save them to disk. Quick way to toggle different settings and view soft proof. Notice that Rendering Intent was saved in name.
- Device to Simulate: Pick your printer here.
- Preserve RGB Numbers: What does output look like **without** the use of a profile?
- Rendering Intent: Select the best based on soft proof.
- Simulate check box affect dynamic range of soft proof by taking paper and ink into account. Use in Full screen mode only!

*See the "Soft Proof" tutorial on www.digitaldog.net

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When you use the Simulate check boxes, only the black and white within your image undergo the simulation. Problem is, the user interface (menus, palettes) do not change their appearance and your eye always adapts to the whitest white in a scene. For this reason, you should be in Full Screen Mode with NO palettes showing when using this simulation. Setup the soft proof as you wish. Type the F key twice, then the Tab key once and you will have the image in Full Screen Mode.

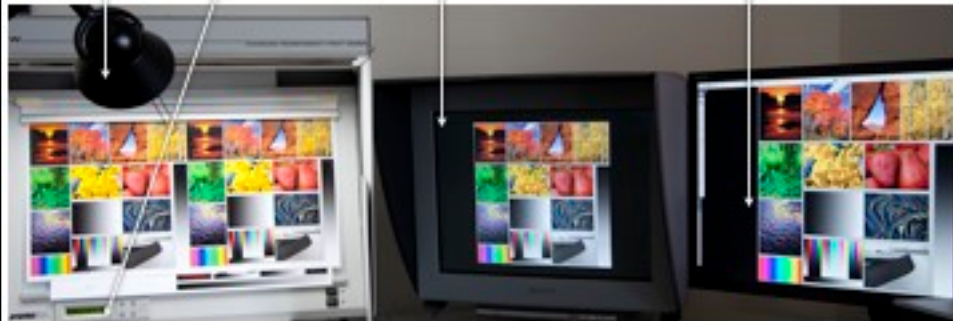# Print to Display matching

Both need to be accounted for!!!
Calibration of luminance ("Backlight" intensity) based on viewing conditions!

Older, CRT at current max luminance @95cd/m2
(Must lower viewing booth to match)

Booth dimmed 50% to match LCD

Solux task light

Wide gamut LCD with proper luminance
calibration 150cd/m2 (to match booth)

Position booth and display to avoid any light spill on display

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Building your own printer profiles?

Solutions range in price from $500 to $5000+

Try using "canned" profiles first. Epson printers are very
consistent from unit to unit, thus a good canned profile can work
well. Quality of paper manufacturers supplied profiles vary.
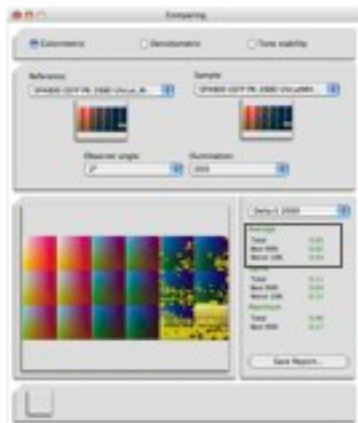
The average deltaE of over 5000
patches on multiple 4800s, is wow,
0.05!

A deltaE of 1.0 or less is not visible
to humans.

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Important Terminology

- Glossary of terms: http://www.ronmartblog.com/2010/07/epson-printing-series-danos-dictionary.html
- Bronzing: The effect of seeing a flash of bronze color reflecting off pigment inks. Sometimes confused with gloss differential.
- Gloss Differential: Similar to Bronzing in terms of the visual effect but without the bronze color and usually seen in highlight areas of the print.
- Metamerism (really Metameric Failure): The effect where by two colors appear to match under one illuminant but not another.
- Giclee: A French word ("to squirt") used in the marketing of ink jet prints by those that don't know better. If you hear the term, run away!
- Out-Gassing: A phenomenon where the humecitant or anti-drying agents in inks come out of the print and are deposited on a surface such as the glass in front of a framed print.

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Printing in Photoshop

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Actually "to squirt" is I'm told, the polite translation of Giclee. Ejaculate is said to be a better translation. Bottom line, its a BS marketing term, beware of those trying to sell you using this term. Archival Ink Jet is becoming a more accepted term for high quality, photographic, archival prints.

Before Printing in Photoshop

Installing ICC Profiles..

Windows: Right Click on Profile*, select *Install Profile* option. Easy!

Macintosh OS X:
System->Library->ColorSync->Profiles
Or:
User->Library->ColorSync->Profiles
Profiles placed here are available only to the current logged-in user.

**Actual Locations:
Windows 7, Vista and XP: \Windows\system32\spool\drivers\color
Win98/Me - Windows/System/Color
WinNT - WinNT/System32/Color
Win2K- WinNT/System32/Spool/Drivers/Color
WinXP - Windows/System32/Spool/Drivers/Color

**Epson installed profiles are placed within a "package" in the system Library
when the driver is installed (Library>Printers>Epson>InkJet>ICCProfiles*)
*right click to open package

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Before Printing in Photoshop

The "Epson Profiles"

SP4800 = Epson Stylus Pro 4800
SP7898 = Epson Stylus Pro 7800 or 9800
SP7999 = Epson Stylus Pro 7900 or 9900
EM = Enhanced Matte
EVFA = Epson Velvet Fine Art
PAWRC = PremierArt™ Water Resistant Canvas
PGPP250 = Premium Glossy Photo Paper (250)
PLPP260 = Premium Luster Photo Paper (260)
PSMPP250 = Premium Semimatte Photo Paper (250)
EFP = Exhibition Fiber Paper
USFAP = UltraSmooth Fine Art Paper
PK = Photo Black Mode
MK = Matte Black Mode
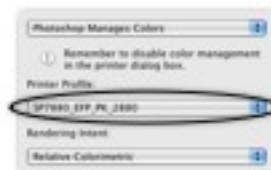
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Printing in Photoshop

Select Page Setup and configure

Use the No Color Management setting if you previously used Convert to Profile*!

*No Color Management is NO longer an option in CS5

Printing in Photoshop

Page Setup-Choose your printer, then paper size.

Printing in Photoshop
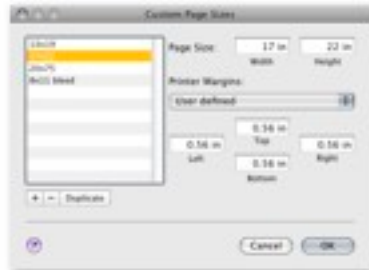
Page Setup-Create a Custom Paper Size
Create equal margins to print in exact center.

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Printing in Photoshop

Print –Let Photoshop Manage Colors

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Printing in Photoshop

Print–Pick the Profile

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Printing in Photoshop

Print–Pick the Rendering Intent
Now click Print….

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Printing in Photoshop

Print-The Epson Print Driver: Leopard.

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Printing in Photoshop
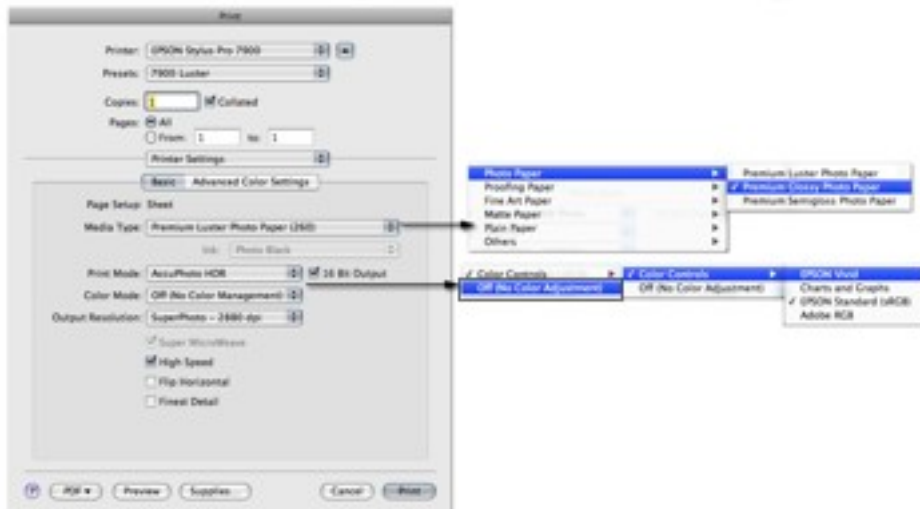
Print Settings: Leopard -Selecting correct media.

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Printing in Photoshop

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Printing in Photoshop

Select Page Setup and configure

Print with Preview–Let Photoshop Manage Colors

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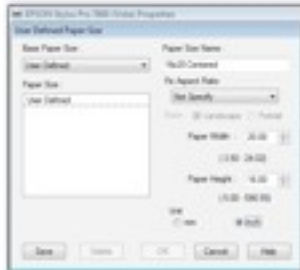
Epson Driver

Page Setup-Create a Custom Paper Size
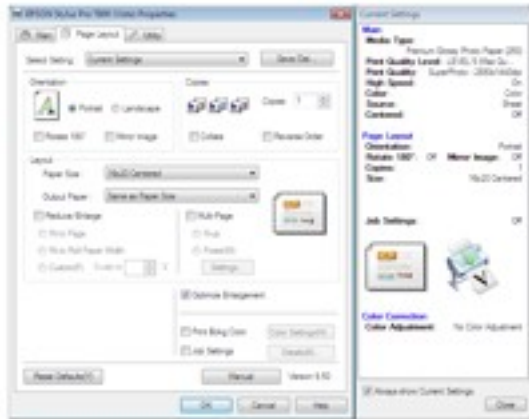
Epson Driver

Page Setup-Choose your print & paper size

Epson Driver

Win XP-Print Settings-Select Properties
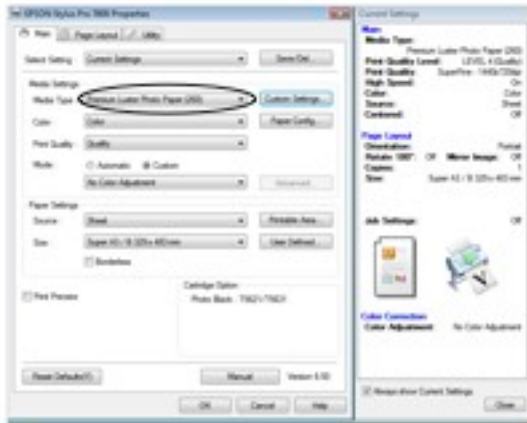
Epson Driver

Setting Media and Advanced Settings

Win XP

Epson Driver

Win XP
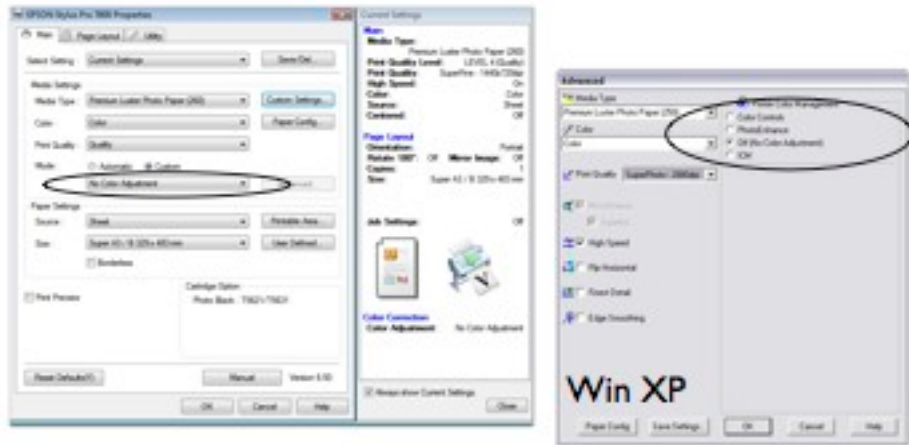
Printer Color Management-Color Management <u>OFF (No Color Adjustments)</u>
If you wish to use Epson ICC profiles.

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Epson Driver

Win XP
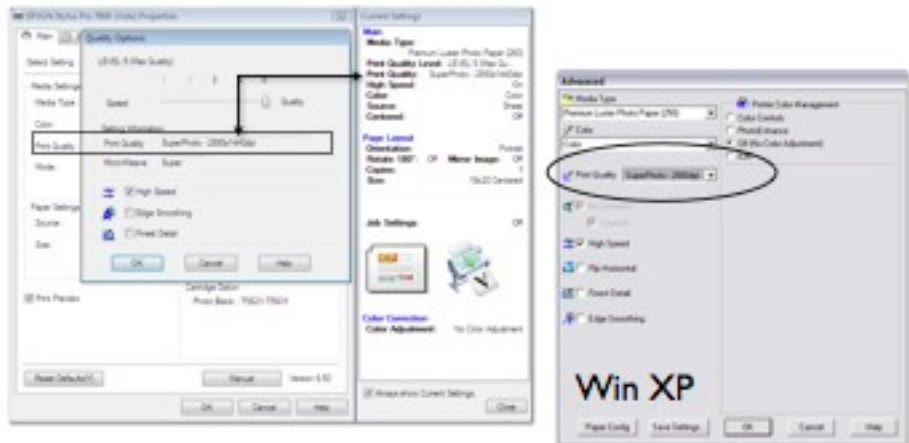
Print Settings Advanced-Selecting Print Quality.

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Epson Print Utilities

Print Driver Utility-Windows

Print Driver Utility-Mac OSX

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Epson Print Utilities

EPSON LFP Remote Panel
Cross-platform, Stand alone utility.

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Printing in Photoshop

Top Printing Errors

No Color Management

If your printed image is darker than expected and has a strong greenish cast, you probably turned off color management in both Photoshop and the Epson printer driver.

Double Color Management

If your printed image is lighter than expected and has a strong red/magenta cast, you probably turned on color management in both Photoshop and the Epson printer driver or didn't use No Color Adjustment

Printing in Photoshop

Top Printing Errors

Wrong Profile Selected

Make sure you select the correct ICC profile for your media.

Printing in Photoshop

Top Printing Errors

Wrong Media Settings

Make sure you select both the correct media setting
AND
output resolution for your intended output.

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Printing in Photoshop

Top Printing Errors

Optimum Final Resolution for ink jet:
Based on 720/1440/2880 DPI

180 ppi.

240 ppi.

288 ppi.

360 ppi.

480 ppi.

Select Bidirectional, High Speed with newer printers unless your computer is very old and slow.

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Same pixel dimensions, but output resolution determines print size!

Turn off Resample check box.
Enter size you wish. Let resolution fall where it may, even "odd" values.

Send the all data to the printer at the size you wish.
Size THEN Sharpen based on these output settings!

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Printing in Photoshop

Top Printing Errors

Optimum Resolution for ink jet:

8x10 prints or smaller:
Image resolution: 360-480 ppi.
Printer resolution: 2880* dpi.

11x14 - 13x19:
Image resolution: 240-360 ppi.
Printer resolution: 2880* dpi.

16x20 and bigger:
Image Resolution: 180-240* ppi.
Printer Resolution: 1440-2880 dpi.

* For Micropours papers (not cotton fiber), settings above 1440 are accessible

9600 pixels would produce a 20" print at 480 (480ppi times 20 inches is 9600 pixels)

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Advanced B&W

- **Advantages**: Conducts a very neutral (if so set) B&W conversion for you from color images.
- Uses less ink, (almost no yellow ink and only a minute amount of cyan and magenta.
- No hue drift between black and white.
- More archival (according to Wilhelm testing*) up to 300 years!
- **Disadvantages**: No preview of your image in driver (not possible yet).
- Can't custom tone or color using Photoshop tools as everything is converted using proprietary driver process.

*http://www.wilhelm-research.com/

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Epson's Advanced B&W
(Leopard)

Select Adobe RGB in Photoshop when using Advanced B&W. The driver expects a 2.2 gamma doc. When converting from color to Grayscale, its important to set your gray gamma to 2.2 in color settings.

Try Dark as an initial start. Normal is way too light!

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Printing in Lightroom with a little help from Photoshop

- Use Lightroom for all raw rendering, heavy lifting (global color and tone corrections).
- Use Photoshop for precise pixel based editing: Compositing, layer effects, text, and soft proofing.
- Use the right tools for the right job. Lightroom produces parametric edits (instructions for rendering) while Photoshop alters pixels. Draw a line in the sand when moving from Lightroom edits to Photoshop. Pre and post parametric editing.
- After Photoshop editing, keep that version in the Lightroom catalog for printing because its faster, easier and just as good.
- Printing in Lightroom for some, is worth the price of admission. Lets see how...

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First, set Export Preferences

Select the encoding color space for editing in Photoshop.

File Format: TIFF
Color Space: ProPhoto RGB
Bit Depth: 16 bits/component
Resolution: 240
Compression: None
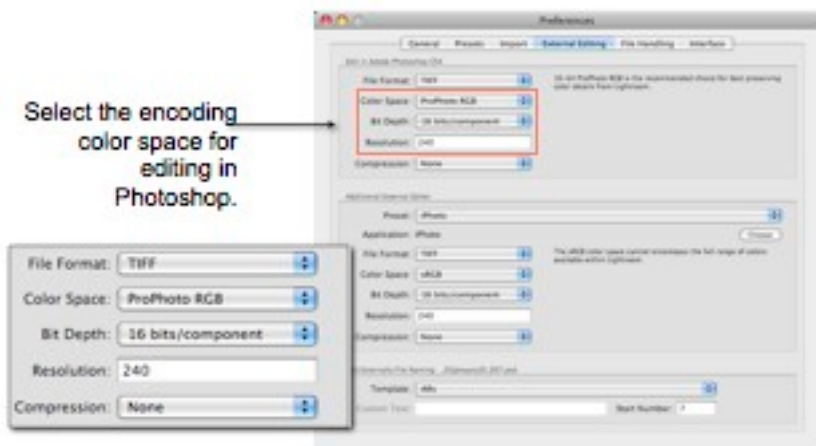
Best practice here would be to export highest resolution image, widest gamut, 16-bit data.

See: http://www.digitalphotopro.com/gear/imaging-tech/the-bit-depth-decision.html

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Lightroom's Library module.

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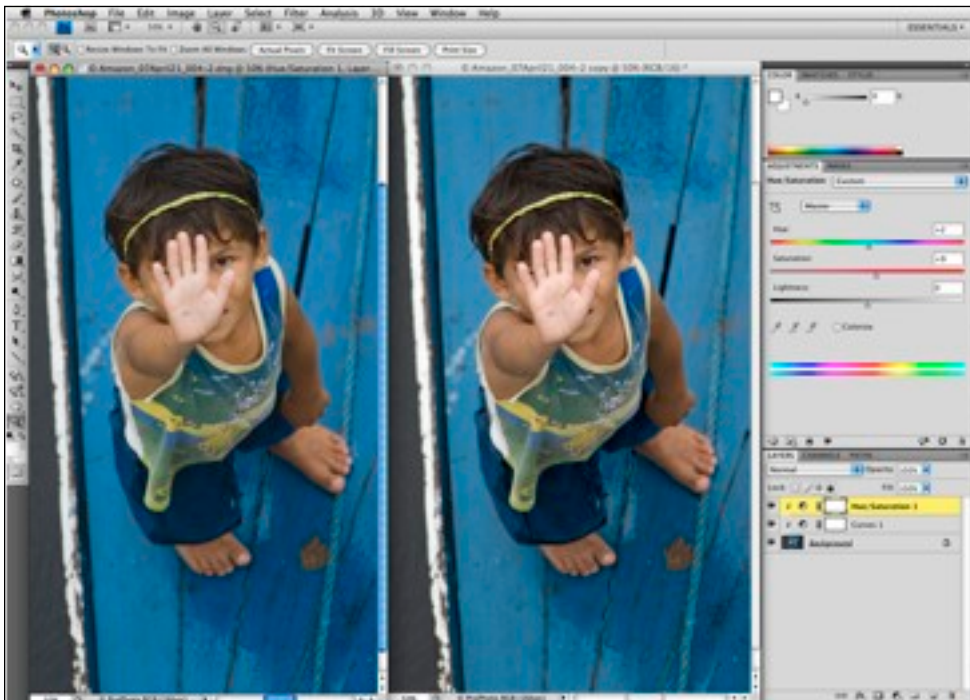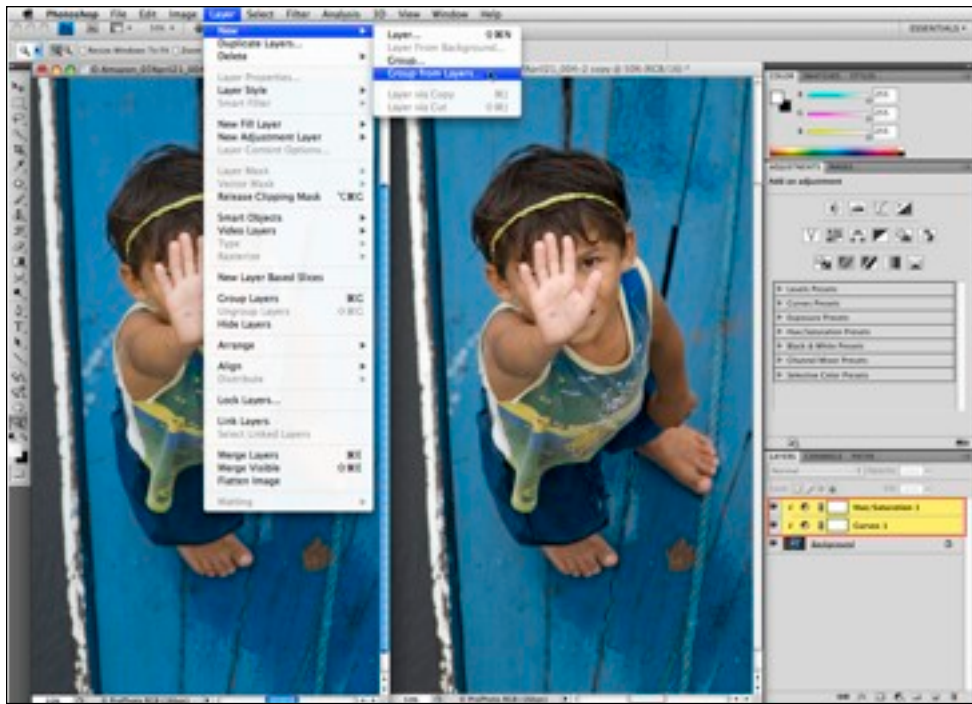Command/Control or Edit in Photoshop CS5 of the selected image.

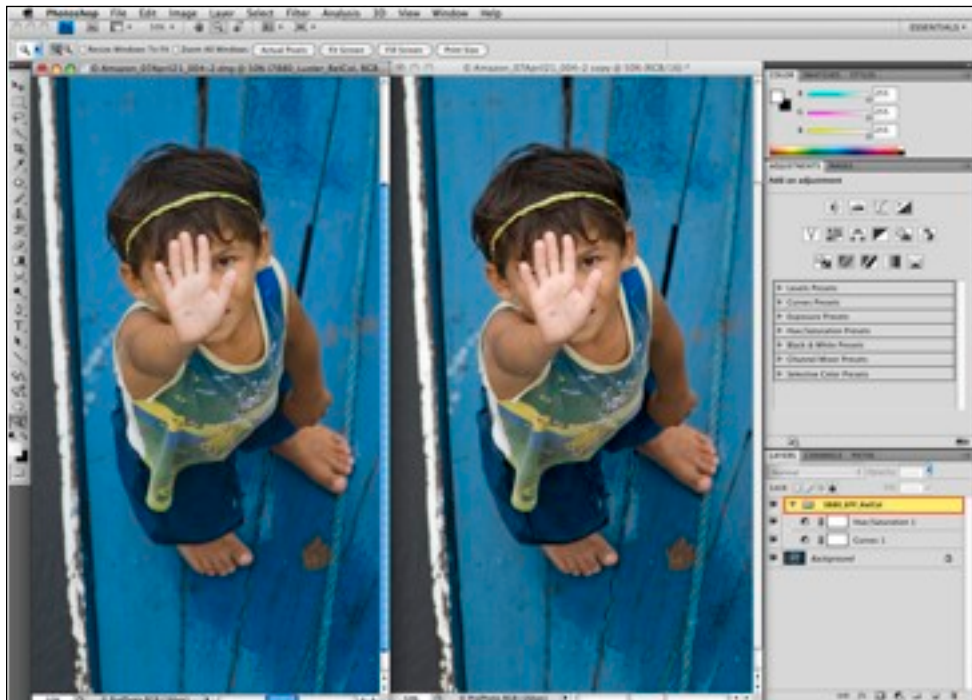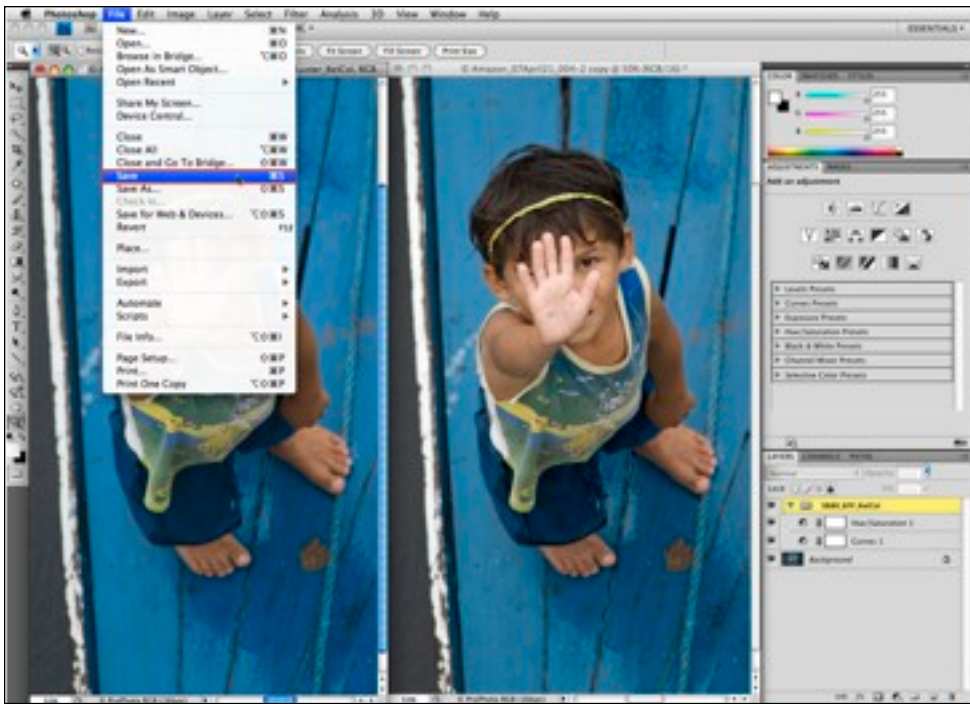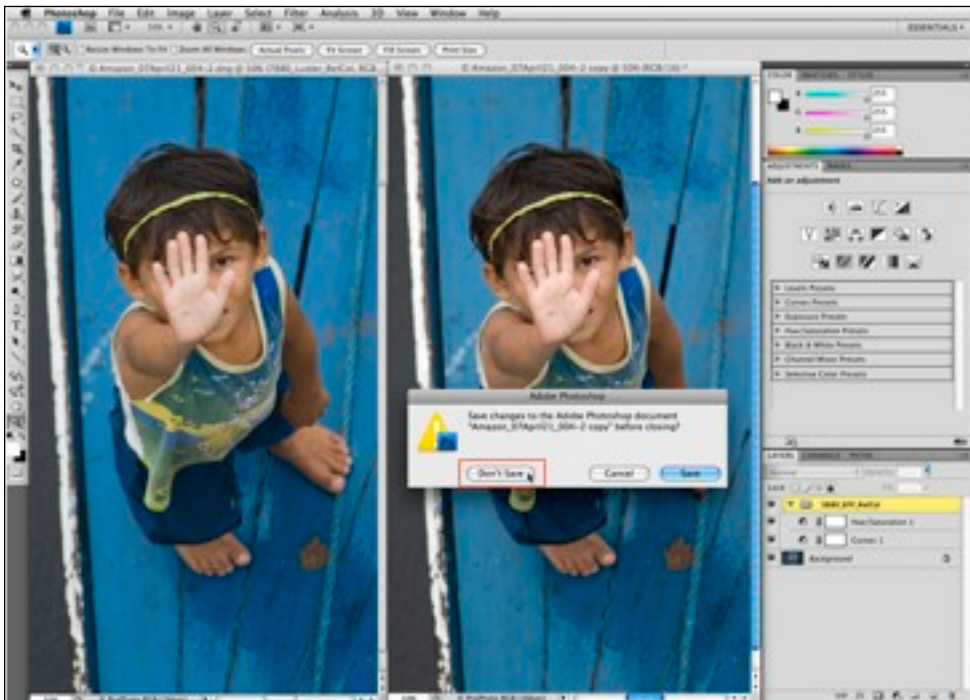48

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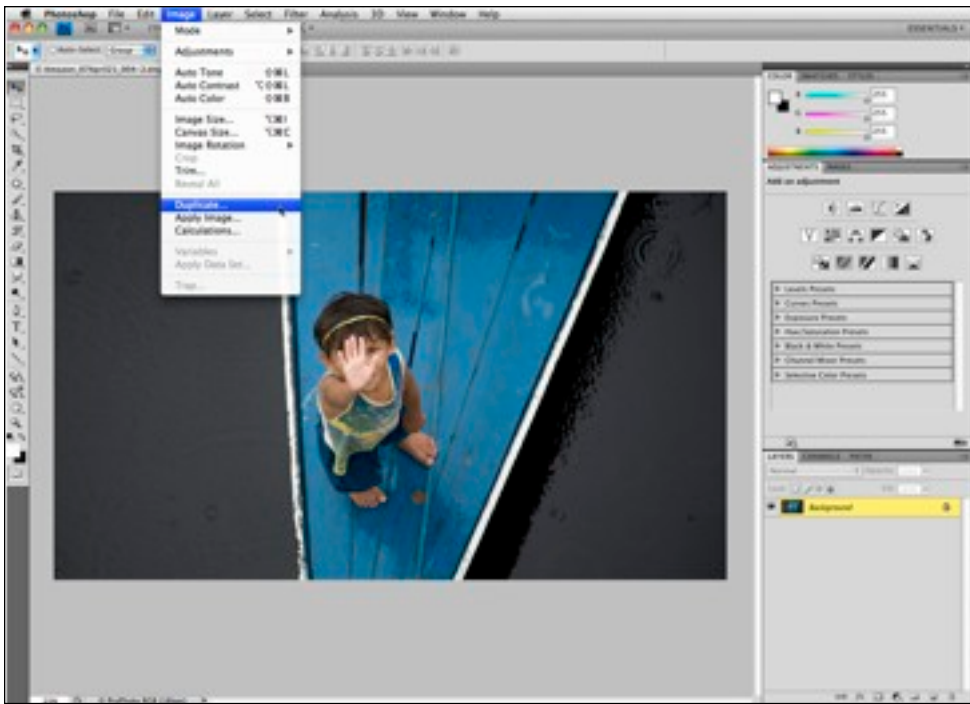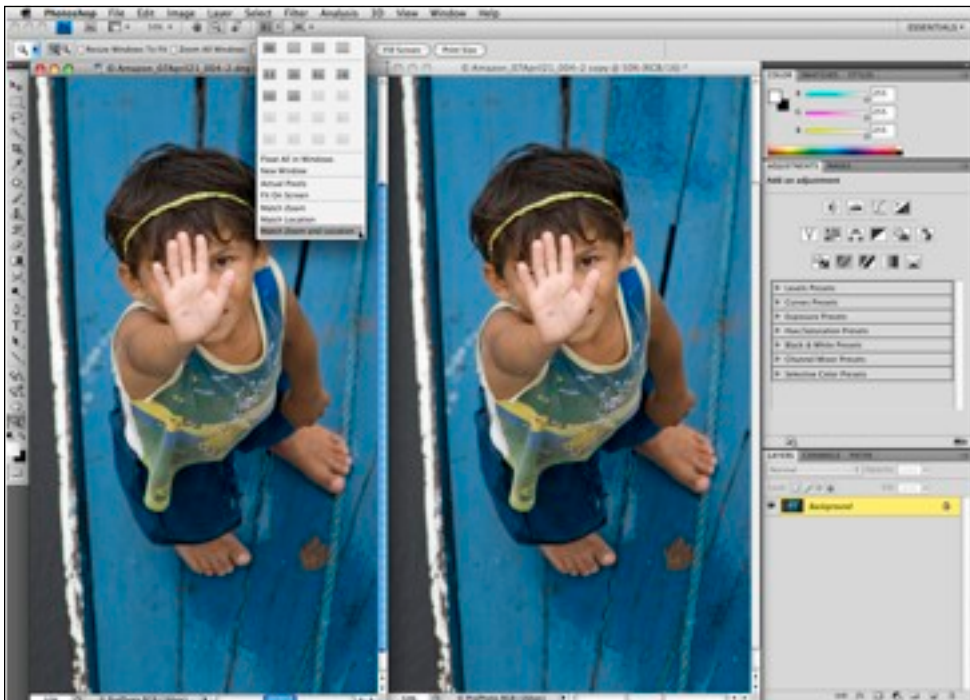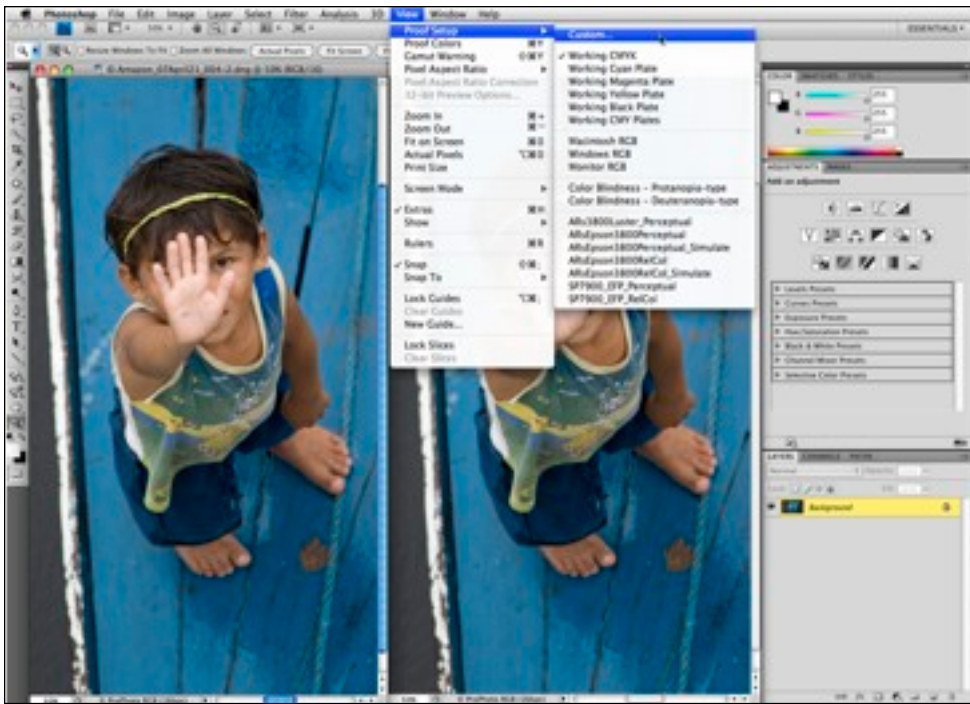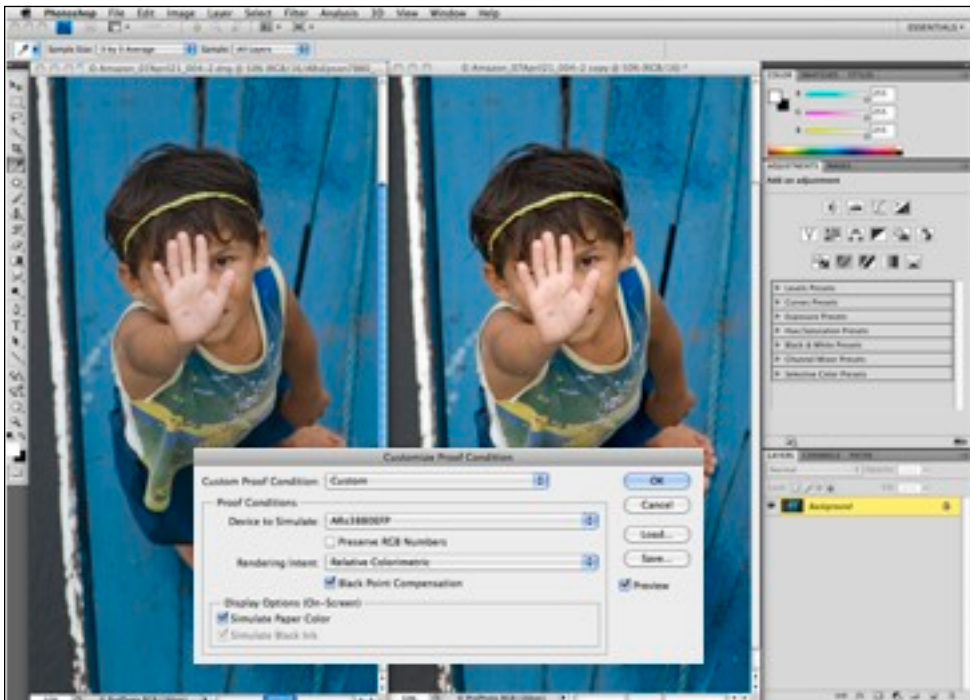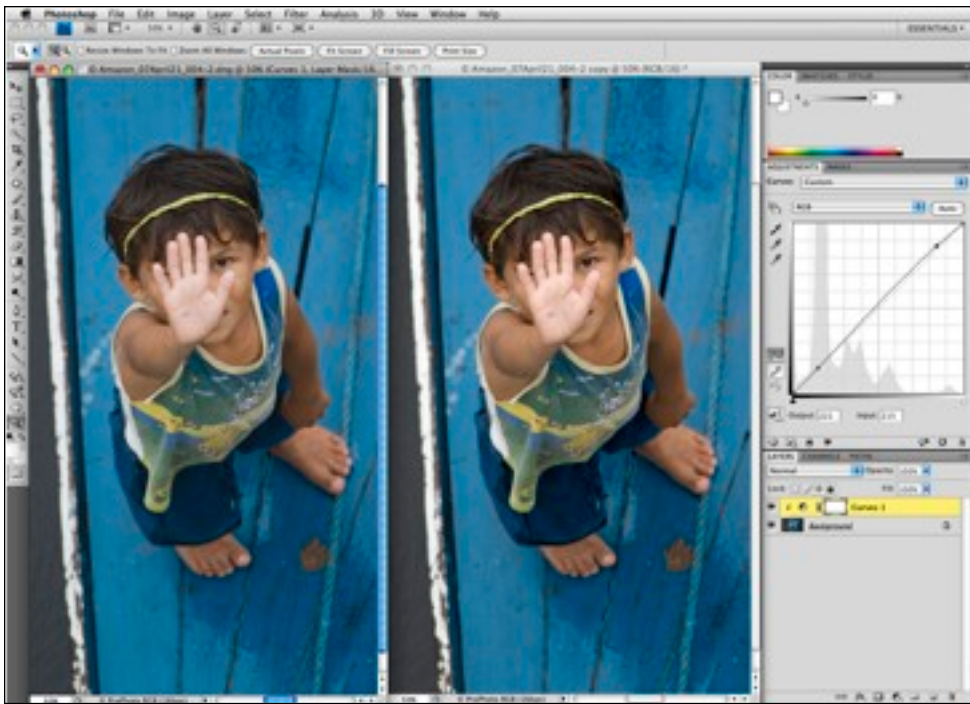
Use a descriptive name for the layer set (printer, paper, rendering intent).
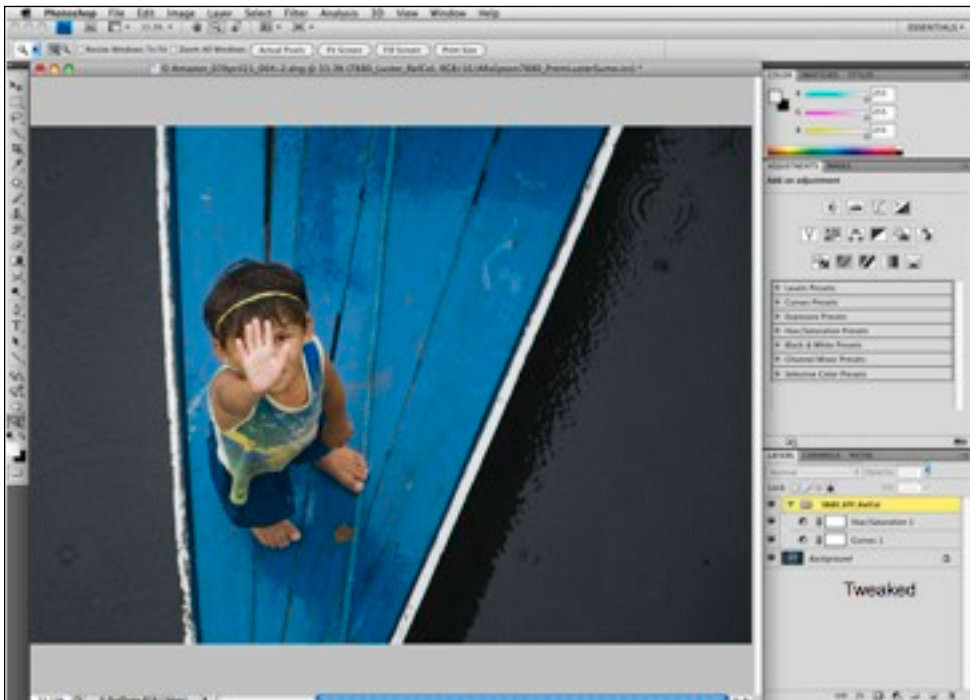
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Save (back into Lightroom).

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No need to save the copy.
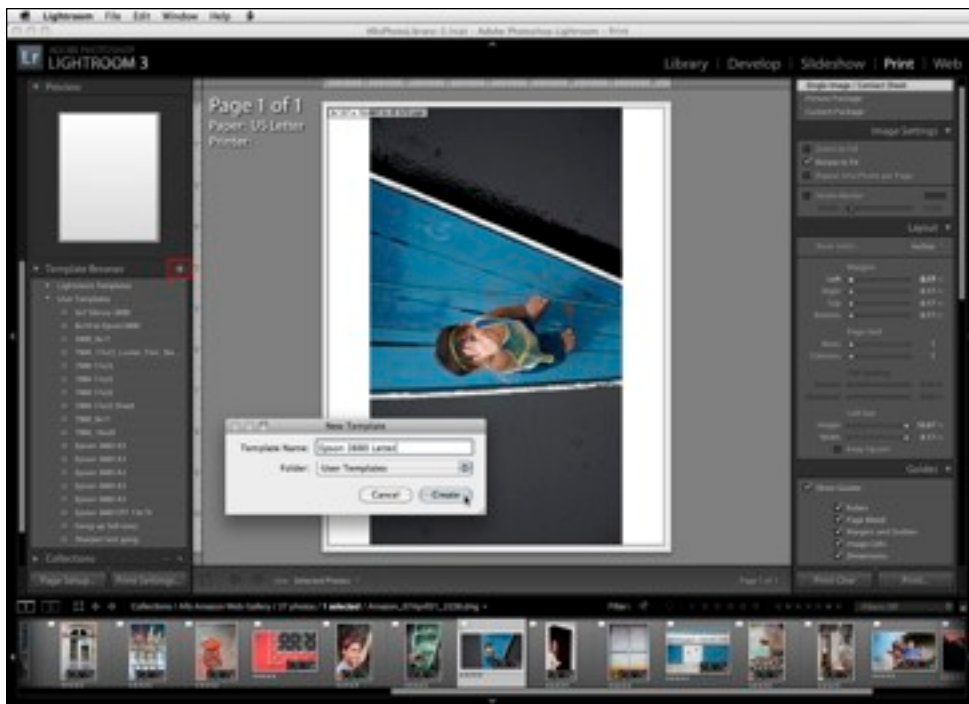
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The Before...

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The after...

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First make Page Setup for your specific printer so LR "knows" the size you wish to print. Rotate to Fit automatically places image places image into page.
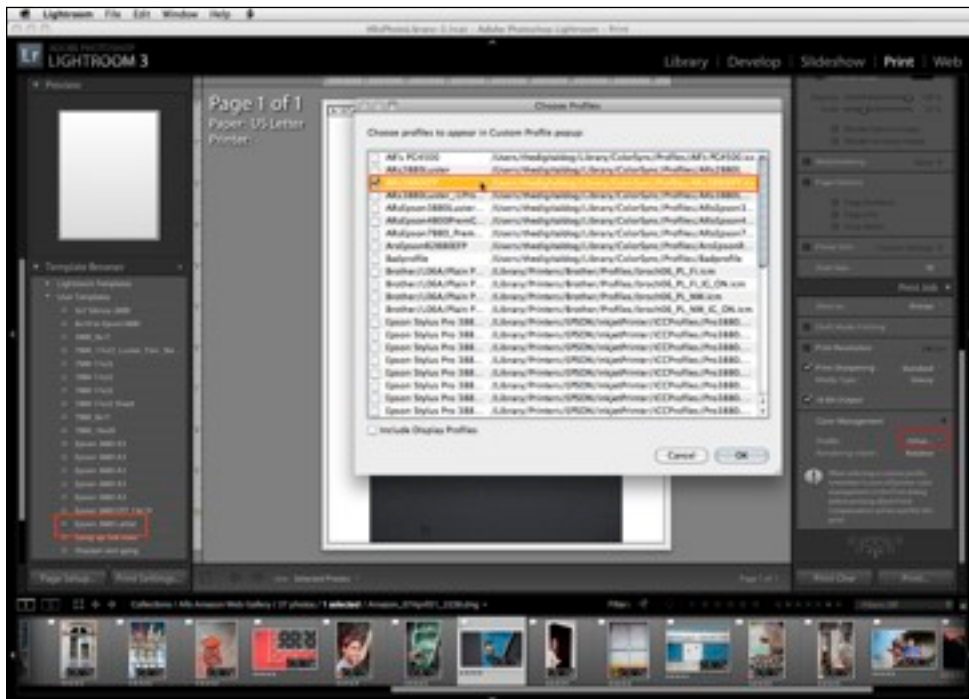
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Note that size is shown above when "Show Dimensions" check box (in Guides area of pane) is checked.

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Here I have a template saved for the 3880 for a 8x11 page size as seen above.

Select the correct profile by selecting "other" for Profile. This dialog will appear. Filter profiles you wish to see. Include Display Profile should be checked for Advanced B&W so you have access to Adobe RGB (1998). Otherwise, to keep the list shorter, you can keep the check box off as seen above.
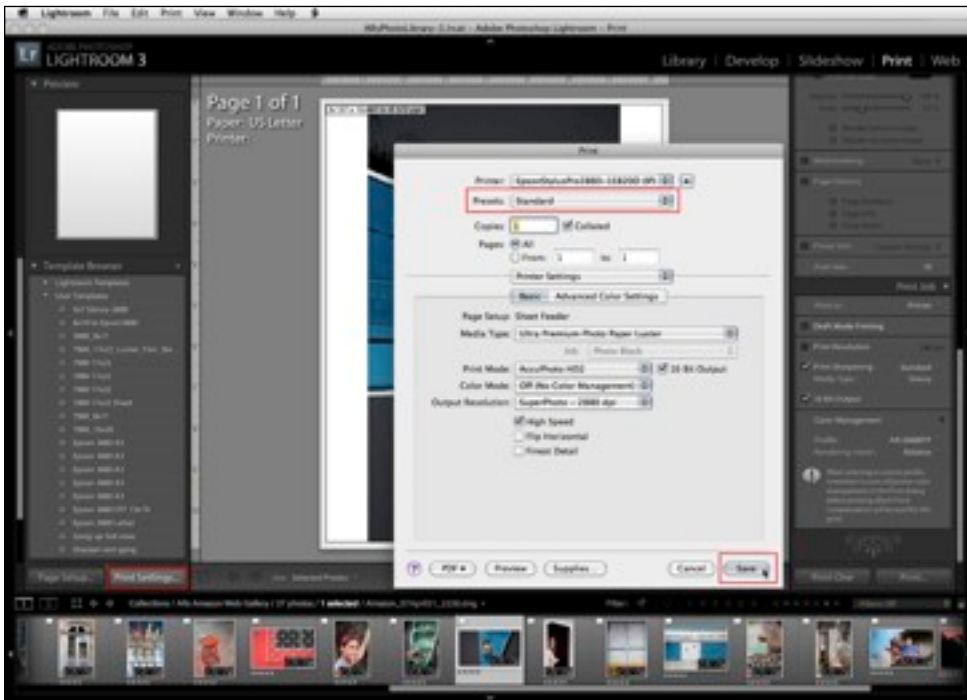
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Select the amount of output sharpening. Start with standard (matches PhotoKit Sharpener).

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Select the type of media used for printing for correct sharpening.

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Click on Print settings, set driver correctly. Note that what is normally the "Print" button in Lightroom is instead "Save". This will save these settings into the current template. Always use Standard Settings (not presets) in Lightroom!

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Option or Right click on the template to update all the current settings into the template. Now you can select one or any number of images in the filmstrip, click Print... and each will be printed the same way, with the same settings in that preset!
At this point, you may wish to save the Template name with information about the output profile and rendering intent since all this has been specified and saved within the template. For example, Epson 3880 EFP RelCol

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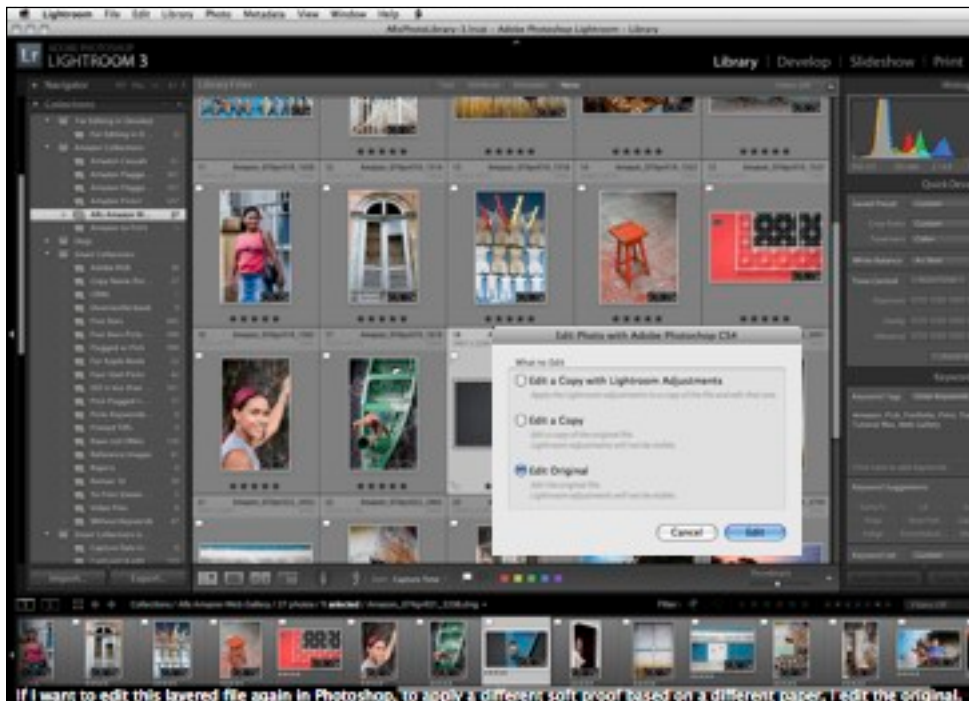
If I want to edit this layered file again in Photoshop, to apply a different soft proof based on a different paper, I edit the original.

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Question & Answers

Thank you for coming. If you were provided with evaluation forms, please fill them out.