

Full Range HDR

Photomatix - Part I

We present essential manual steps to use your DSLR to capture light's full range at Magic Hour. Pictorial examples break this method of *Creating Fine Art Magic* into a routine series of simple steps; capture, combination to 32 bit hdr file in ~~Photomatix~~ or CS4, global sharpening and tone mapping in Lightroom, with final touches in Photoshop.

Most DSLRs provide rudimentary high dynamic range (HDR) raw image capture. Capture is helped by Automatic Exposure Bracketing (AEB). AEB expects you to set aperture, ISO, and choose an initial shutter speed. When active, AEB then quickly captures n images at different shutter speeds. In older DSLRs, that may only be 3 images (0, -1EV, and +1EV). An EV is about an fstop. Today's professional DSLRs can capture up to 9 images...

Unfortunately, such arbitrary ranges may not include all light available. With Full Range HDR, manual capture is designed to take the entire range of available light. Start with overexposed and go to underexposed histograms using LCD previews to make a more accurate series of initial images. For example, daytime HDR may have data ranges of 10-12 EV. Sunset HDR ranges may range from 16-20 images. So, you can capture all light...



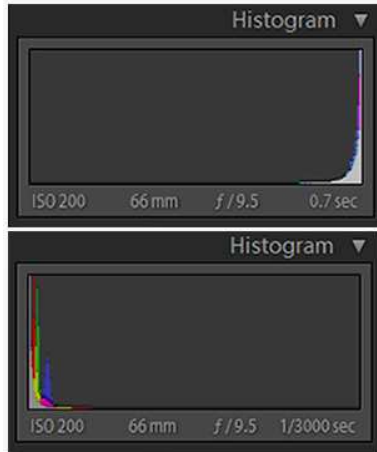
Here is a before and after image comparison of two images; the first is the middle shot of a full range capture. The second is the 16 bit tif file resulting from a 32-bit HDR Photomatix set. Neither has been tone mapped to what the eye saw.

Don't stop there; Full Range HDR allows most prosumer DSLRs to compete with more costly professional digital cameras in *'getting the full range of HDR data'*

This tutorial has a strange history; it quickly became apparent I don't want to use Photomatix. Unfortunately, Photomatix takes too much final repair time, because of bad noise and chromatic aberration algorithms. Yet, here, for teaching purposes, I start off talking Photomatix and end up talking CS4 - CS4 assembles the beginning image properly, reducing effort to skillfully complete a fine art image.

Full Range HDR Capture

Camera Setup



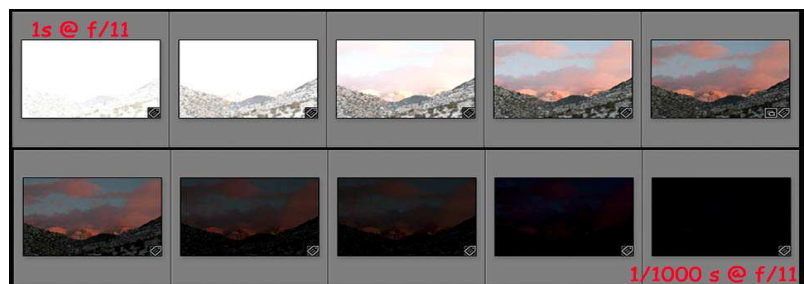
Nikon D300 on tripod, 14 bit raw file setting, ISO 200, f/11, Δ EV = 0.5 / shutter speed click exposure compensation +1 EV (removes some gray from snow). Because I was shooting in snow, I had manually set the camera for a +1 EV exposure to try to compensate for a matrix meter deciding the snow was gray.

Begin by opening your shutter 6 - 10 full EV clicks (moving main dial left), taking a shot and repeating, 'til your highlights histogram fit shows less than 10% of light. Upper histogram - image 1 at 1s and f/11.

Then, 2 clicks at a time, move shutter control right, take each shot (perform raw file capture), 'til only 10% of your darkest shadows remain. The lower histogram shows last image 10 at 1/1000s and f/11.

When you are done, you have captured ALL reflected light into a sequence of raw files which will provide grist for the next 2 important steps - combining to 32 bit HDR. Then tone map 16 bit results.

For Magic Hour capture, your click range may be larger than this sunset example depending on full tonal contrast ~ shoot, check your histogram, and choose the initial HDR capture when your histogram resembles the first one above... then quickly finish all dark captures!



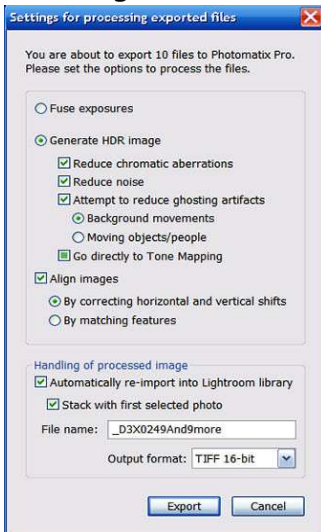
Let's review steps from capture of 10 images, to each histogram evaluation for when to start and stop 'rotating shutter dial', and getting a 16 bit tif which LACKS true Tone Mapping.

This experiment was done @ 5:30 PM. Shutter speeds ranged from 1s...1/1000, aperture f/11, and ISO 200. In effect, this capture has a full range of 10 EV containing many images near the end of each histogram spectrum.

Enter Lightroom

Lightroom has become my standard for preprocessing images. Now, we must convert all 16 bit raw images to a single 32 bit .hdr file. Photomatix has created a plug-in, which lets you generate the 32-bit HDR file. Then, you can choose whether *or not* you want to use their tone mapping algorithms.

Select all appropriate raw files for each full Range HDR capture in Lightroom. Using file menu in Library mode, do File> Plug-In Extras> Export to Photomatix.



In this case, after Selecting Source Images, you are presented with the following Photomatix dialog box...

Photomatix Pro 3.2.7

Photomatix settings are shown on the left. I perform several important activities: reduce chromatic aberrations, noise, and ghosting. Choose all options and click Export.

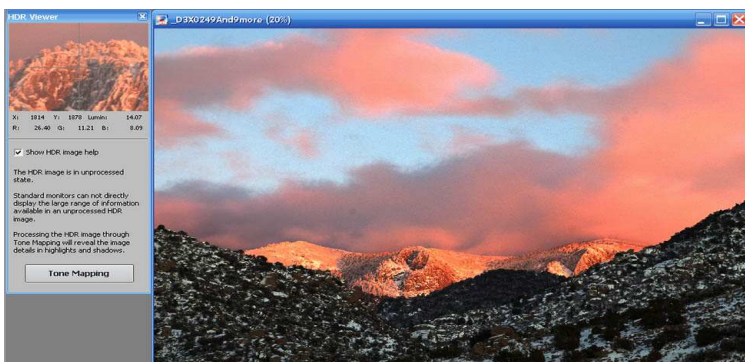
PP will go away, alerting you as each substep occurs. When done, you get a 32 bit result.

For this particular HDR compilation, a dual CPU 1.8 GHz machine took ~ 7 minutes to make the 32 bit file. I usually save this file, because the process can take 10 to 20 minutes

for 10 to 20 full range capture images.

Save 32 Bit File

Photomatix creates an image before you 'tone map'. I always save this file as 32 bit .hdr - there is little point in repeating computer work and you may want

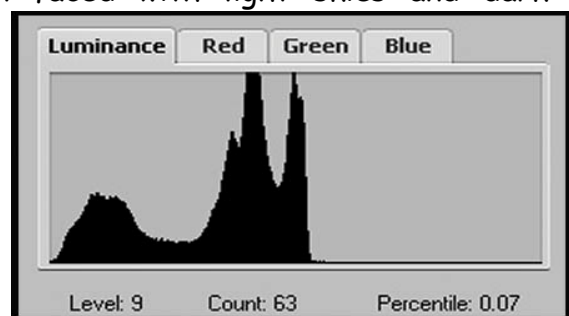


to process it one of several ways.

Tone Compressor's 16 bit 'Tone Mapping'

As a Magic Hour shooter, I am often faced with light skies and dark foregrounds. Magic Hour produces bi-modal histograms (two humps on histogram - one for sky and one for foreground).

By experiment, I find Details Enhancer - primary menu choice in PP - IGNORES bi-modality ~ then produces its own *guesswork* histogram. As a result, I loose the fullness of truly capturing Magic Hour. With time, I learned to Tone Compress at Default settings. This produces a 16 bit tif image - with that *all important* bi-modal histogram still intact. This luminance histogram represents data range from the picture immediately above.



Two things are immediately apparent; I've got a clear bimodal histogram. And, I need to carefully tone map the color distribution for mid tones and highlights.

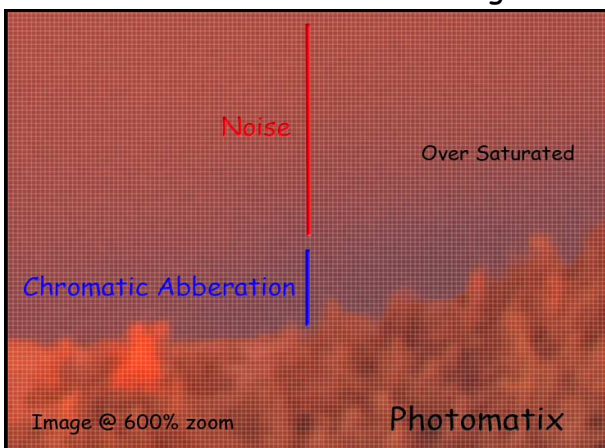
By choosing Default, I ignore PP for the final Tone Mapping result - although in PP's misplaced lingo, I have 'Tone Mapped' ~ if with garish overtones.

Hi-Res Sky Image Scan

Shooting a lot in the Southwest US, I'm always aware of potential dust spots. So, I ALWAYS begin with a hi-res sky scan - running zoom to 600% quickly shows me those dust spots and any other imperfections. CS4's Page Down key lets me quickly scan for blemishes - 1st Home, then Page Down until done.

With a video card supporting OpenGL, you're really set. Several features are rather important; flick panning, pixel grid display above 500% magnification bird's eye zoom-out (press H holding down the mouse and 'moving' image), and image rotation. One of great strengths is a rapid ability to move the zoomed field with just a mouse flick. Hi-res scans are a *pay me now, or pay me later* thing...

But, the scan also shows me some serious deficiencies in Photomatix - it's really not the best at either reducing



1. noise or
2. chromatic aberration.

The upper 600% zoom image has a blue zone - that's chromatic aberration. It's a multi hour job to carefully clone that edge blur away.

At scale of a small printed page, noise is hard to see; but it's there, particularly on a big calibrated screen. So, you must mask, then do noise reduction on the sky.

Conclusions

With 3 HDR images, Photomatix does an adequate job. With 10, noise and chromatic aberration increase markedly. It's simply not worth the clone / mask time to repair before starting delicate tone mapping!

I thank Sandy Corless for discussions about her experiences with Dan Burkholder's HDR workshops on Full Manual HDR Capture and its subtle Glow...

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