# A Digital Workflow
for Raw Processing
Part Three: White Balance

As I indicated before, the white balance of any raw conversion is absolutely critical—so critical that I feel compelled to devote an entire section to it. Most of today's cameras that allow saving captures as raw files also enable you to set a white balance while shooting. However, when you're shooting raw, this white balance is saved only as an EXIF (Exchangeable Image File Format) metadata tag. In fact, when you're shooting raw, the only camera setting that will have a significant impact on the raw capture is the camera's ISO setting. The ISO setting changes the analog-to-digital conversion process by amplifying the signal from the sensor. Virtually all other camera settings that you set on the camera will result only in an informational tag that conversion software may or may not use when processing the raw conversion. When you're shooting JPG files, these settings do affect the resulting recorded file. It's amazing to me that the on-board camera DSP (digital signal processing) chips can do a raw sensor capture to a gamma-encoded and JPG-compressed recorded file as swiftly and accurately as they do. However, for a raw capture, the raw file does not receive any significant image process-ing after capture. I say *significant* because some cameras do have some settings that may influence aspects of the resulting raw capture, but for the current issue of white balance, let's assume that raw is raw.

In the following shot of a small ColorChecker, the various default white balance settings are displayed. This list shows the default Temperature and Tint settings that Camera Raw has determined are appropriate for captures done under various lighting condi-tions. They are not, however, an exact match for the various cameras' white balance settings when processing JPG files, and they may not be accurate to the various camera manufacturers' raw processing SDKs. The reason is that while there are some standards in EXIF metadata, and some standards in the way raw captures are processed and saved to disk, there are no real standards regarding either the standard color temperature terms or the way this data is written to files. Therefore, at best, Camera Raw makes a guess, and at worst, the guess may be wrong. Until the major camera manufacturers can agree to some standard terms and standards on how the white balance is stored in raw files, raw processing by third parties will be a best-guess situation. To the camera com-panies, Adobe® is a third party, and so far, there's a lot of documentation that is simply unavailable to Adobe.
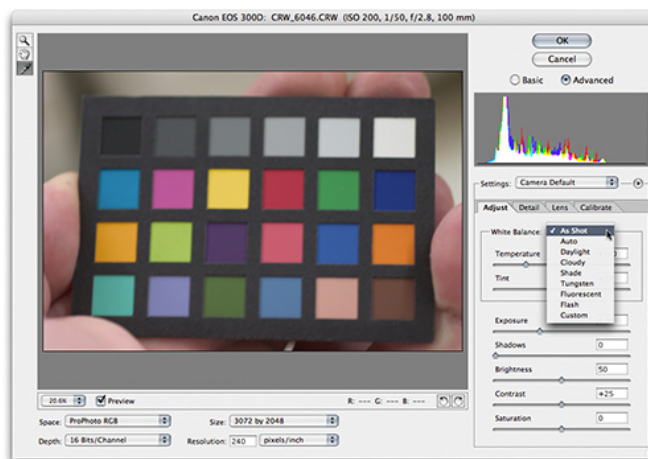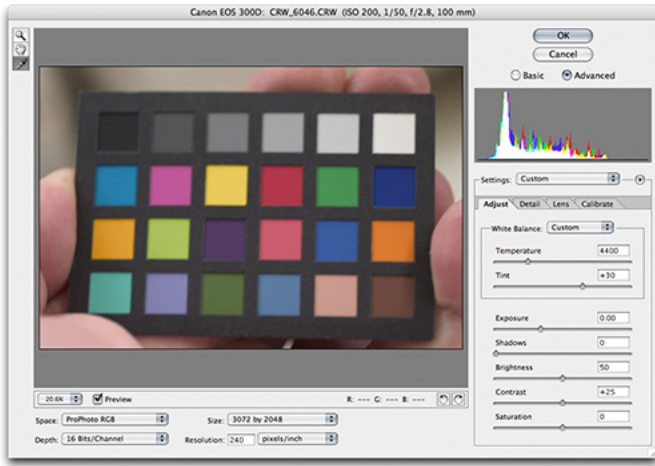

Default white balance settings in Camera Raw
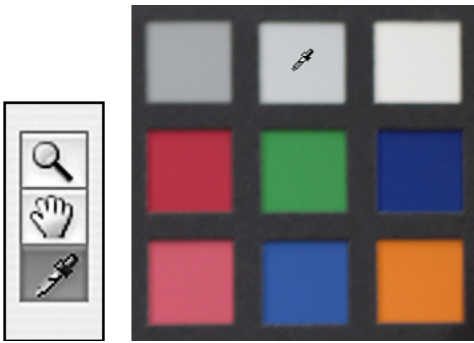
Camera Raw tools (left), White Balance tool over the second brightest patch on the ColorChecker (right)

To address this situation, Camera Raw includes the White Balance tool (it looks like an eyedropper) to enable users to custom white balance on known neutral samples. To be clear, this tool is designed to be used on light, nonspecular neutral tones, such as the second brightest patch on the ColorChecker. It is not designed to be used on a gray card sample. A gray card's tonality is too far down the luminance scale. Because of the lower tone value, there may be noise that can affect the resulting accuracy of the white balance. The tool was actually designed to use a sample such as the ColorChecker, and as such, becomes a very powerful, accurate, fast, and easy method of white balancing. So, the ideal solution for accurate white balancing in Camera Raw is to shoot a ColorChecker at the beginning of a series of shooting where the light balance will remain consistent. Filmmakers call this *shooting the chips* and use it to help colorists match color for scene-to-scene color continuity in postproduction. This same approach can greatly aid digital photographers in achieving white balance consistency from scene to scene when shooting multiple locations or shots in a session.

To be useful, the shot of the chart needs to be only reasonably well exposed and must be in the exact same lighting conditions of the scene or subject you are shooting. It doesn't even need to be sharp or in focus. It also doesn't need to fill the frame (as in these example shots); however, it should not be so tiny that you can't zoom in from within Camera Raw and get a usable sample size. In addition, the eyedropper in Camera Raw is a fixed pixel size of 5 x 5 monitor pixels, regardless of the zoom percent. So, while you can't change the fixed sample size, you can substantially change the effective sampled area. At 100%, the sample is 5 x 5 actual image pixels. At 50% zoom, the sample is an effective 10 x 10 image pixels. At screen zooms bigger than 100%, the effective size remains 5 x 5.

After Camera Raw corrects white balance, the drop-down menu for the
white balance settings reads Custom

After you click in the sample area, Camera Raw uses the color readings to accurately correct
white balance. Under the white balance settings, the drop-down menu reads Custom. You can
choose to manually adjust the resulting white balance to warm or cool or alter the tint. Gener-
ally, only a very slight adjustment is required.
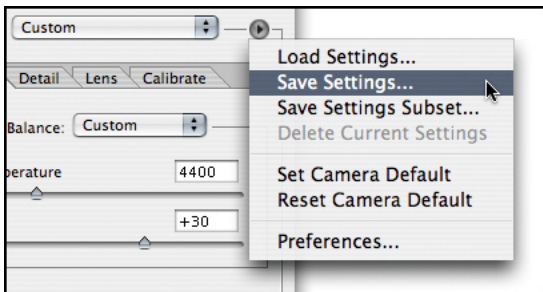

The Save Settings command

If you are a Camera Raw user, a wise investment of your time is to shoot a color sample in the
variety of lighting conditions that you often face. You can store the white balance settings (and
other settings, such as detail, chromatic aberration, or calibrate settings) in saved Camera Raw
settings files and choose them directly from the custom settings pop-up menu.
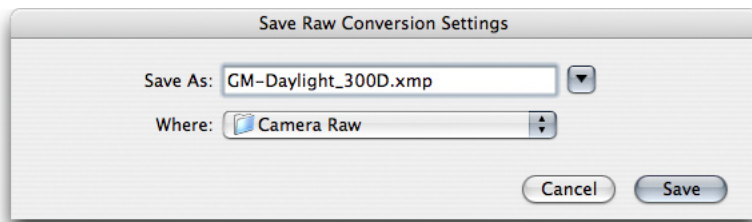

A descriptive file name for saved settings

When you name these saved settings, it's useful to be descriptive of both the conditions and the
cameras you may have. In rare cases, you may need slightly different custom settings if your
camera bodies vary greatly.

After saving your settings, you can quickly and easily select the correct settings for your particu-
lar lighting conditions. Note that in most cases, when you're doing these sorts of custom setups
for lighting conditions, I strongly suggest you save only a subset of the custom settings. For white
balance, I suggest saving only the white balance and calibrate settings because you will need to
adjust the other settings on an image-by-image basis.
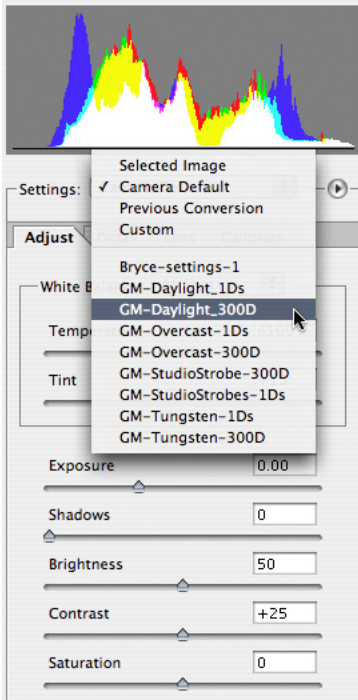
File names should specify the camera.
Access saved settings from the Settings menu.
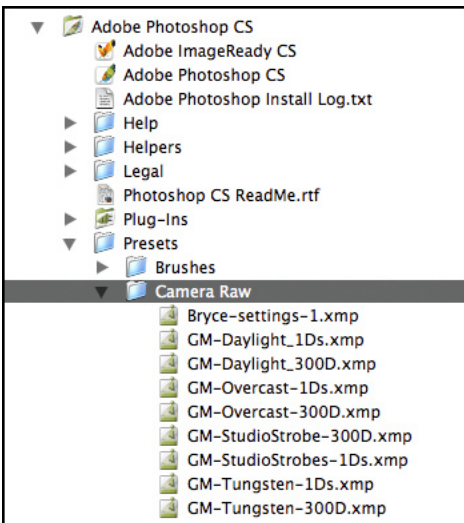

The folder structure for setting files

Be sure to specify your camera in the file name. What works for one model may not be at all accurate for a different model. Also note that Camera Raw saves these settings files in its own subfolders in the Photoshop CS/Presets folder. Unlike what these screen shots show, I suggest you put the camera name/number first to better aid the organization of the menu. While writing this paper, I realized that I had been doing it wrong (a learning experience for me).

On a more complex level, the following figures show how you can visually calibrate using Bruce Lindbloom's synthetic ColorChecker and his color space conversions of the spectro-photometer readings.
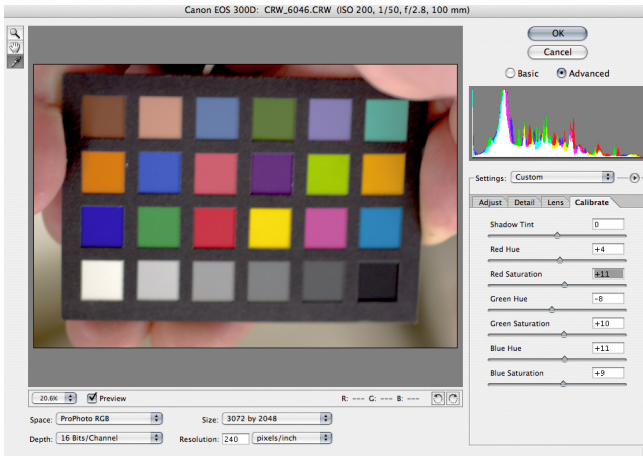
Adjusting to visually match the synthetic file

Above is a raw shot of a small ColorChecker and the required calibration settings to adjust for a visual match with Bruce Lindbloom's synthetic file. Note that I had to rotate the image to match the orientation of the ColorChecker (I shot it upside down).
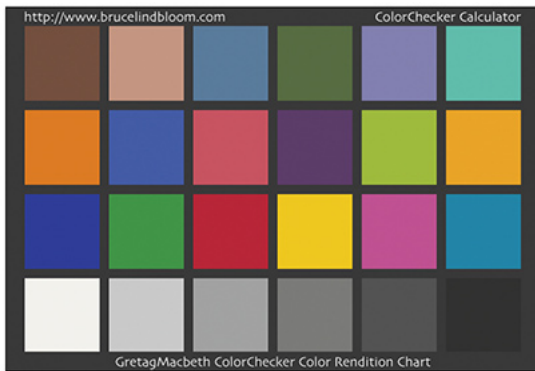
The ColorChecker sample file

Note also that the synthetic ColorChecker comes in Photoshop Lab space and must be converted to the working space you'll be using in Camera Raw—in this case, ProPhoto RGB.

The calibration adjustments I've made come close to the appearance of the ColorChecker sample file from Bruce Lindbloom.

Resources:
Bruce Lindbloom's synthetic ColorChecker and the color space readouts:
http://www.brucelindbloom.com/index.html?ColorCheckerRGB.html

Information regarding GretagMacbeth:
http://www.gretagmacbeth.com

Alternative white balancing through WarmCards:
http://www.warmcards.com

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